

PUBLIC HEALTH REPORTS

VOL. 30

AUGUST 13, 1915

No. 33

STANDARDS FOR DETERMINING THE PURITY OF MILK.

THE LIMIT OF ERROR IN BACTERIOLOGICAL MILK ANALYSES.

By H. W. CONN, Wesleyan University, Middletown, Conn.

Anyone who has had any experience in comparative bacteriological tests knows that discrepancies in the reports of analyses of supposedly identical samples of milk are frequent, when the samples are submitted to different laboratories for examination. Sometimes it happens that the discrepancies reported are extremely wide, so wide, indeed, as to result in the grading of milk samples from the same bottle into different grades according to the laboratory at which the bacteriological analysis is made. These differences in the results of the analysis of identical samples have in some places led to a discrediting of the value of bacteriological analysis. That such discrepancies occur is beyond doubt; and the question arises whether they are due to inevitable difficulties in bacteriological analysis, whether bacteriological analysis has such inherent obstacles that it can not be made reliable, or whether they are due to differences in methods of technique in different laboratories sufficiently great to result in throwing the analyses widely apart. A further question then arises whether, if laboratories could be reduced to identical methods of technique, there would still remain divergence in results, and if so, how great the error of bacteriological milk analysis would be.

The American Public Health Association published some years ago its Standard Methods of Milk Analysis, which endeavored to formulate the methods that should be used in the bacteriological analysis of milk. These methods have since been regarded as *standard*, and it has been tacitly assumed that where bacteriological analysis has been made of milk the methods followed have been essentially the standard methods of the American Public Health Association. But in spite of this attempt to reach uniformity, divergent results of bacteriological analyses have continued to be repeated, and questions as to the reliability of all such work have been asked more and more insistently.

In October, 1914, four of the large laboratories in New York City determined upon a cooperative test by which some of these questions

should if possible be answered. The laboratories concerned were the public health laboratory of the city of New York under the supervision of W. H. Park; the Lederle laboratory, the bacteriological work of which is directed by H. D. Pease; the sanitary laboratory of C. E. North; and the bacteriological laboratory of the Borden Condensed Milk Co., under the direction during the experiments first of Dr. F. X. Govers and later of Mr. W. D. Strack. These laboratories requested the author of this paper to serve as referee for the series of tests. The planning and coordinating of the whole series have been in his hands and all of the reports were forwarded to him for tabulation and study. This paper is the result of these tests, which have lasted seven months and involved something like 20,000 separate analyses by a variety of methods. It has not been possible to report in this paper all of these analyses, but the most significant ones are tabulated below.

The general plan of the experiments has been as follows: Upon certain convenient dates the referee distributed to the different laboratories a series of samples of milk, sometimes as many as 40, in other cases as few as 15. These samples represented milk of all types, pasteurized, raw, and of the various grades of milk sold in New York City, including certified as well as milk of grades A and B. They also included samples from other places that were not graded at all. As will be seen from the figures below, they represented, from a bacteriological standpoint, practically every type of milk that might reach the market, from the highest grade to the lowest. The samples were numbered in such a way that the laboratories could not compare notes with each other, and moreover, in each case the samples were frequently in duplicates. Sometimes each laboratory received three duplicate samples from the same bottle, all differently numbered, and in most cases two duplicate samples of each bottle were distributed. Of course, all of the laboratories received identical samples throughout, only under different numbers, and in the first series of tests each laboratory was to make the analysis of these samples by its ordinary methods of technique. All plates were to be counted at the same time—namely, after a period of 48 hours—and the report of each plate count was sent to the referee. The different laboratories were not expected to make their own interpretation of their figures, but were to leave that to the referee after the figures had been brought together and properly tabulated. The results of the figures after tabulation were returned to the laboratories, to serve them as guides in the next series of tests to be undertaken, and this plan was kept up through the whole of the first series of experiments. In the later series various modifications of the tests were made. As will be seen from the tables given below, quite a large number of factors which may be supposed to modify the results of

bacteriological analysis were tested out in the different experiments, for the purpose of determining as closely as possible to what factors the discrepancies in the reports of the different laboratories were due.

FIRST SERIES OF TESTS.

The first series of tests was by far the most extended and involved the analysis of 200 samples by each laboratory by five different methods and in three different dilutions, some 10,000 separate analyses in all. In this series the endeavor was first to determine how closely comparable the results of these four laboratories were when using methods of technique which each had adopted in its ordinary routine. For this purpose the samples to be tested were examined in the laboratories without informing the assistants who were making the analyses of the real significance of the work. The samples were then tested by the routine method in use in each laboratory at that time.

The wire loop versus the pipette method of dilution.—There had been developed in the laboratory of the New York Board of Health a method by which the use of pipettes might be dispensed with and in their place a platinum loop of a definite size, supposed to hold $\frac{1}{100}$ c. c. of milk, might be substituted. The accuracy of this method had never been tested out except in a single laboratory, and it was thought that possibly the use of the wire loop explained the fact that the board of health laboratory had the reputation of reporting higher results than other laboratories. In this series of tests similar loops were placed in the hands of each of the four laboratories, and the samples of milk to be tested were submitted to analysis both by the use of the wire loop and by the standard method of using pipettes. The routine of the board of health laboratory in the use of the wire loop was such as to furnish only a 100 and a 10,000 dilution, the 1,000 dilution being omitted; in the other laboratories a 1,000 dilution was also made.

Media.—To test out the question of whether the modification in media makes a noticeable difference in the results, three different media were adopted in this series of tests. One was the standard agar medium, as described in the standard methods. The second was the same as the standard but with the substitution of Liebig's beef extract for beef infusion. A third was a dilute medium made of beef extract, but with the nutritive ingredients reduced to one-twelfth of the amount that is present in the standard agar and having an acidity of only .3 per cent. These three were tested side by side in all of the first series of experiments.

The first series of tests consisted of five different test days. On each of these days there were submitted to the four laboratories 40 samples, variously duplicated and variously numbered, and each of them was tested by the three different media and the two different

methods. This plan was repeated on five different days during a period of about three weeks, no attempt being made in this series to modify methods of routine in any of the laboratories.

Effect of crowding.—One general result of all of the series of tests here reported may be best mentioned at the outset. The more the plates are crowded with colonies the larger is the number of bacteria that are prevented from developing colonies, and therefore the lower is the count. In practically the whole series of thousands of experiments it was found that those plates in which the number of bacteria were over a thousand gave uniformly a lower proportional count than plates where the colonies were considerably under the 800 figure. In order to give a reliable result, the plates should contain a number of bacteria not over 200. It would even be desirable if the number of colonies should be between 40 and 200 on the plates that were to be counted; but this is possible only when miscellaneous samples of milk are examined by large numbers of separate dilutions, which in routine work seems to be out of the question. It must therefore be borne in mind that a high-seeded plate will give a marked underestimate of the total number of bacteria present in the milk sample.

Explanatory remarks.—In most of the following tables there is given only the final report which would be made as to the analysis. In order to show how this final figure has been obtained and also to show how the dilutions compare with each other, there are given in Table I the actual counts upon three illustrative samples just as they were received by the referee. In this table the final figure to be reported is in black-faced type, and in determining this figure the reports marked with an asterisk (*) were not used. In general the method of obtaining this final report was as follows:

No plates which contained less than 20 or more than 800 colonies were considered unless the milk had so few bacteria that no plate had as many as 20 or so many that even the 10,000 dilution gave more than 800 to a plate. Where two plates were found with colonies between 20 and 800 the final figure was an average of the two. This will be understood from the examination of Table I, in which the figures found with each dilution are given, as well as the final report, the latter marked "Rep."

In Table II and all following tables the different dilution figures are omitted, only the final report being given.

In all of the tables samples with the same number are samples from the same bottle of milk thoroughly mixed.

The different laboratories are represented by letters, and where two or more reports are given the same letter and number it indicates that two or more samples of the same bottle of milk were given to each laboratory under different labels.

"S. method" indicates the loop method and "P. method" the pipette method of securing $\frac{1}{100}$ c. c. for diluting.

"P. media" refers to the dilute media used (containing one-twelfth the standard amount of nutrients). "S. media" refers to the standard beef-infusion medium adjusted to 1.5 per cent acid. "Ex. media" refers to the standard medium made with beef extract instead of beef infusion.

After the number of the sample the letters indicate the character of the milk, "P." indicating pasteurized, "C." certified, and "R." raw milk.

The letter "S" in the tables indicates a spreader, and a (?) indicates that for some reason the count was not reliable. The sign (-) indicates that no report was sent.

"Unc." indicates that the colonies were so numerous that they were not counted.

TABLE I.—A complete report upon three illustrative samples.

SAMPLE NO. 3.

	Dilution.	P. method. P. med.	P. method. S. med.	S. method. S. med.	S. method. P. med.	S. method. Ex. med.
Laboratory A.....	100	500	S.	2,200	200	100
	1,000	2,000*	3,000	2,000*	2,000*	7,000*
	10,000	10,000*	20,000*	(-)	10,000*	(-)
	Rep.	500	3,000	2,200	200	100
Laboratory A.....	100	700	3,900	(-)	500	1,000
	1,000	(-)	20,000*	1,000	1,000*	(-)
	10,000	10,000*	(-)	(-)	(-)	(-)
	Rep.	700	3,900	1,000	500	1,000
Laboratory B.....	100	700	1,100	700	600	500
	1,000	1,000*	1,000*	1,000*	4,000*	1,000*
	10,000	(-)	(-)	10,000*	(-)	(-)
	Rep.	700	1,100	700	600	500
Laboratory B.....	100	5,100	6,700	7,500	6,800	6,100
	1,000	4,000*	4,000*	12,000*	7,000*	4,000*
	10,000	(-)	(-)	(-)	(-)	(-)
	Rep.	5,100	6,700	7,500	6,800	6,100
Laboratory C.....	100	4,000	S.	S.	300	5,000
	1,000	(-)	(-)	(-)	(-)	(-)
	10,000	(-)	(-)	(-)	(-)	(-)
	Rep.	4,000	S.	S.	300	5,000
Laboratory C.....	100					
	1,000					
	10,000		Missing.			
	Rep.					
Laboratory D.....	100	4,300	800	1,500	4,600	600
	1,000	2,000*	2,000*	1,000*	5,000*	(-)
	10,000	20,000*	(-)	20,000*	20,000*	20,000*
	Rep.	4,300	800	1,500	4,600	600
Laboratory D.....	100	9,000	3,400	S.	16,400	900
	1,000	17,000*	9,000*	9,000	3,000*	1,000*
	10,000	20,000*	(-)	40,000*	10,000*	10,000*
	Rep.	9,000	3,400	9,000	16,400	900

SAMPLE NO. 42.

Laboratory A.....	100	1,600	2,100	6,500	58,000	51,000
	1,000	12,000*	6,000*	34,000	33,000	38,000
	10,000	90,000*	40,000*	10,000*	140,000*	60,000*
	Rep.	1,600	2,100	20,000	44,000	44,000
Laboratory A.....	100	11,100	11,200	39,000	46,000	56,000
	1,000	60,000	10,000*	52,000	91,000	80,000
	10,000	100,000*	40,000*	50,000*	50,000*	50,000*
	Rep.	35,000	11,200	45,000	68,000	68,000

TABLE I.—A complete report upon three illustrative samples—Continued.

SAMPLE NO. 42—Continued.

	Dilution.	P. method. P. med.	P. method. S. med.	S. method. S. med.	S. method. P. med.	S. method. Ex. med.
Laboratory A.....	100	20,000	1,500	12,300	40,000	9,000
	1,000	30,000	(—)	52,000	32,000	12,000
	10,000	100,000*	10,000*	40,000*	20,000*	30,000*
	Rep.	25,000	1,500	32,000	35,000	10,000
Laboratory B.....	100	42,000	1,000	1,100	80,000	64,000
	1,000	4,000*	2,000*	4,000*	75,000	85,000
	10,000	10,000*	10,000*	10,000*	(—)	70,000*
	Rep.	42,000	1,000	1,000	77,000	74,000
Laboratory B.....	100	64,000	900*	18,000	40,000	24,000
	1,000	160,000	240,000	160,000	25,000	230,000
	10,000	40,000*	80,000*	(—)	100,000*	10,000*
	Rep.	114,000	240,000?	79,000	32,000	127,000
Laboratory B.....	100	(—)	(—)	200	14,000	Con.
	1,000	(—)	(—)	4,000*	4,000*	13,000
	10,000	(—)	(—)	(—)	(—)	60,000*
	Rep.	(—)	(—)	200	14,000	13,000
Laboratory C.....	100	150,000	5,100	S.	126,000	S. 96,000
	1,000	(—)	(—)	(—)	(—)	(—)
	10,000	80,000*	(—)	(—)	120,000*	10,000*
	Rep.	150,000	5,100	S.	126,000	96,000
Laboratory C.....	100	100,000	5,700	14,400	99,600	102,000
	1,000	(—)	(—)	(—)	(—)	(—)
	10,000	250,000	130,000	40,000*	310,000*	210,000*
	Rep.	100,000	67,000?	14,400	99,000	102,000
Laboratory C.....	100	146,000	10,400	9,000	140,800	104,000
	1,000	(—)	(—)	(—)	(—)	(—)
	10,000	60,000*	60,000*	20,000*	60,000*	50,000*
	Rep.	146,000	10,400	9,000	140,000	104,000
Laboratory D.....	100	42,000	16,000	15,600	96,000	48,000
	1,000	96,000	34,000	(—)	(—)	23,000
	10,000	40,000*	20,000*	(—)	(—)	13,000*
	Rep.	62,000	25,000	15,600	96,000	35,000
Laboratory D.....	100	100	500	S.	400	54,000
	1,000	(—)	1,000*	72,000	1,000*	85,000
	10,000	1,000	(—)	(—)	(—)	50,000
	Rep.	100?	500	72,000	400	54,000
Laboratory D.....	100	200	400	300	72,000	96,000
	1,000	1,000*	(—)	(—)	80,000	82,000
	10,000	(—)	10,000*	(—)	140,000*	10,000
	Rep.	200	400	300	76,000	88,000

SAMPLE NO. 59.

Laboratory A.....	100	16,000	34,000	110,000	21,800	100,000
	1,000	44,000	280,000	350,000	174,000	58,000
	10,000	80,000*	190,000*	360,000*	100,000*	230,000*
	Rep.	30,000	157,000	230,000	98,000	79,000
Laboratory A.....	100	340,000*	(—)	206,000	23,000	33,000
	1,000	420,000	(—)	740,000	280,000	260,000
	10,000	2,400,000	(—)	990,000	350,000	390,000
	Rep.	1,400,000	(—)	860,000	315,000	325,000
Laboratory B.....	100	410,000*	1,000,000*	1,100,000*	390,000*	300,000*
	1,000	500,000	1,920,000	1,360,000	1,500,000	1,280,000
	10,000	2,170,000	3,000,000	1,450,000	3,000,000	3,800,000
	Rep.	1,330,000	2,460,000	1,400,000	2,250,000	2,540,000
Laboratory B.....	100	116,000*	100,000*	510,000*	300,000*	217,000*
	1,000	800,000	320,000	700,000	300,000	287,000
	10,000	2,000,000	1,640,000	400,000	290,000	400,000
	Rep.	1,400,000	980,000	580,000	295,000	343,000
Laboratory C.....	100	(—)	(—)	(—)	(—)	(—)
	1,000	(—)	(—)	(—)	(—)	(—)
	10,000	1,400,000	1,100,000	1,900,000	2,500,000	2,190,000
	Rep.	1,400,000	1,100,000	1,900,000	2,500,000	2,190,000
Laboratory C.....	100	(—)	(—)	(—)	(—)	(—)
	1,000	(—)	(—)	(—)	(—)	(—)
	10,000	2,450,000	3,700,000	2,630,000	2,500,000	2,060,000
	Rep.	2,450,000	3,700,000	2,630,000	2,500,000	2,060,000
Laboratory D.....	100	Unc.	Unc.	Unc.	(—)	S.
	1,000	Unc.	132,000	S. (17)	73,000	360,000
	10,000	880,000	160,000*	40,000	50,000*	230,000*
	Rep.	880,000	132,000	(7)	73,000	360,000
Laboratory D.....	100	Unc.	Unc.	S.	Unc.	(—)
	1,000	Unc.	11,000*	360,000	1,200,000*	300,000
	10,000	2,000,000	1,600,000	310,000	1,070,000	260,000
	Rep.	2,000,000	1,600,000	335,000	1,070,000	280,000

August 13, 1915

TABLE II.—The final report which would be given for each sample of milk submitted to each laboratory.

No.	Laboratory.	L. method, P. media.	L. method, S. media.	S. method, S. media.	S. method, P. media.	S. method, Ex. media.
1 P.....	A	100	4,900	3,300	1,300	600
	A	2,700	700	12,000	5,900	300
	B	500	400	500	300	400
	B	1,600	4,200	1,100	1,300	900
	C	3,200	2,000	3,700	4,500	4,000
	C	S.	1,500	2,300	3,600	2,700
	D	2,000	200	200	4,000	(?)
	D	300	100	700	1,200	1,000
2 P.....	A	2,000	1,000	1,500	1,800	2,500
	A	(?)	1,200	1,400	2,500	1,600
	B	2,300	200	5,500	2,000	4,000
	B	3,300	3,050	300	2,500	1,100
	C	6,000	1,400	1,600	5,000	2,500
	C	3,700	1,300	S.	5,200	3,000
	D	200	300	1,800	4,200	2,200
	D	1,700	1,000	1,000	2,800	1,600
3 P.....	A	400	500	1,000	36,000	52,000
	A	5,000	8,000	5,700	5,100	3,300
	B	300	300	1,600	500	900
	B	1,000	(—)	800	200	600
	C	16,100	12,800	20,000	15,900	25,000
	C	6,000	4,500	3,600	3,600	5,500
	D	(—)	S.	(?)	(?)	3,400
	D	100	100	1,400	800	100
4 P.....	A	100	4,500	4,600	2,200	3,200
	A	1,700	4,900	1,000	22,000	12,000
	B	1,400	1,100	1,200	1,100	1,200
	B	1,200	500	(—)	2,200	300
	C	2,900	1,100	2,000	1,500	2,600
	C	1,400	1,700	1,000	3,600	3,100
	D	1,300	1,000	700	2,400	1,200
	D	500	1,000	600	300	1,000
5 C.....	A	300	1,100	1,200	1,200	600
	A	200	4,500	4,800	2,100	1,400
	B	900	3,900	4,100	1,100	2,400
	B	1,900	2,500	6,100	2,500	5,100
	C	3,200	6,500	6,700	5,700	8,100
	C	13,200	7,800	(?)	8,000	9,200
	D	2,600	2,700	5,200	8,700	3,600
	D	2,000	3,300	4,600	8,100	5,100
6 P.....	A	200	8,000S	1,400	2,600	700
	A	600	500	1,500	2,200	1,000
	B	(?)	(?)	200	800	500
	B	(?)	(?)	5,000	300	22,000
	C	4,500	2,400	4,300	3,200	3,800
	C	2,700	3,400	4,000	5,000	4,100
	D	200	3,000	100	2,300	1,700
	D	800	100	300	1,300	1,700
7 P.....	A	300	800	1,800	2,500	900
	A	800	S.	300	1,300	700
	B	(?)	(?)	300	800	1,000
	B	(?)	500	1,900	(?)	(?)
	C	5,700	2,500S	4,500S	15,800	12,200
	C	14,900	S.	S.	9,800	10,500
	D	600	600	S.	200	S.
	D	300	400	400	3,000	1,700
8 P.....	A	100	500	1,900	400	400
	A	100	800	1,000	1,600	800
	B	1,500	12,000	1,400	4,700	1,700
	B	200	900	8,400	9,100	6,700
	C	8,300	8,400	12,900	12,000	12,400
	C	4,200	4,000	3,000	4,500	4,200
	D	3,300	(?)	5,400	4,600	10,000
	D	900	7,000	11,200	10,400	5,700
9 P.....	A	1,000	600	3,600	1,400	3,300
	A	800	100	1,200	600	900
	B	100	200	200	300	200
	B	500	300	8,000	480	100
	C	1,400	1,800	5,000	2,000	2,100
	C	3,800	2,400	(?)	3,600	4,900
	D	2,000	600	1,400	4,800	400
	D	600	1,200	1,000	4,200	460

TABLE II.—*The final report which would be given for each sample of milk submitted to each laboratory—Continued.*

No.	Laboratory.	L. method, P. media.	L. method, S. media.	S. method, S. media.	S. method, P. media.	S. method, Ex. media.
10 C.....	A	3,700	3,900	6,900	1,800	(—)
	A	1,100	400	3,700	2,000	2,800
	B	3,800	4,100	4,500	1,000	1,700
	B	600	1,100	3,200	3,700	3,600
	C	2,300	7,200	5,000	2,500	8,500
	C	2,800	5,800	4,800	5,000	7,300
	D	5,200	700	6,600	1,500	3,700
11 P.....	D	6,400	1,100	5,100	5,600	2,800
	A	200	400	1,800	1,400	2,300
	A	200	1,000	2,800	800	1,800
	B	4,000	1,800	400	2,500	800
	B	1,000	200	700	200	900
	C	4,000	S.	4,500	6,500	8,200
	C	12,600	S.	6,100	13,000	6,000
12 P.....	D	700	S.	3,000	S.	1,200
	D	5,900	1,500	4,400	10,800	1,800
	A	300	1,300	1,300	900	500
	A	100	600	1,200	700	2,000
	B	300	100	300	1,500	500
	B	Contam.	300	600	200	(?)
	C	19,700	10,000	4,500	4,000	9,000
13 P.....	C	10,900	S.	S.	12,500	8,500
	D	8,700	S.	2,800	10,900	2,500
	D	8,700	600	1,800	6,500	300
	A	100	1,200	2,000	2,500	5,300
	A	1,000	300	200	300	500
	B	(?)	(?)	100	700	600
	B	5,800	5,100	4,300	5,700	4,600
14 P.....	B	2,600	900	900	500	800
	B	2,200	1,800	1,000	2,100	2,400
	C	500	S.	700	600	4,500
	C	3,600	300	2,800	2,700	3,200
	C	800	800	1,400	1,300	4,000
	D	3,700	900	2,300	3,600	1,000
	D	3,900?	300?	1,100	3,800	500
15 P.....	D	2,200	300	200	500	900
	A	(?)	1,300	3,400	1,200	S.
	A	300	200	1,900	2,100	600
	B	600	700	500	1,200	1,600
	B	300	300	400	900	400
	C	7,800	S.	S.	9,500	3,600
	C	13,300	S.	S.	10,500	6,200
16 P.....	D	7,100	3,000?	6,300	11,200	4,100
	D	10,500	1,200	S.	11,100	2,000
	A	3,700	2,700	2,300	2,000	2,300
	A	400	900	1,600	3,000	2,400
	B	1,000	600	700	1,800	1,500
	B	2,000	700	3,500	1,400	200
	C	4,500	2,300	2,200	6,500	4,000
17 P.....	C	6,000	1,400	1,600	5,000	2,500
	D	2,000	300	1,400	3,200	2,500
	D	700	400	1,900	2,800	2,200
	A	(?)	2,000	(?)	400	1,600
	A	400	300	700	700	900
	B	1,300	1,900	2,000	4,200	1,100
	B	1,600	800	1,100	800	8,500
18 P.....	C	2,300	1,000	S.	3,400	2,800
	C	1,300	S.	S.	2,200	400
	D	1,600	S.	S.	3,700	S.
	D	2,500	500	S.	500	S.
	A	500	(?)	1,400	300	2,200
	A	200	300	500	100	1,700
	B	3,600	1,300	(—)	3,400	(?)
19 P.....	B	(?)	4,700	1,800	1,500	2,900
	C	7,500	2,100	2,800	8,600	6,200
	C	6,200	2,100	1,500	6,500	4,600
	D	500	(?)	2,700	1,100	400
	D	500	300	800	600	200
	A	1,600	4,700	2,000	2,500	5,300
	A	2,300	1,200	1,000	400	2,500
20 P.....	B	4,400	4,500	4,800	6,200	4,900
	B	1,400	3,700	2,000	2,800	2,200
	C	3,400	1,400	2,700	9,200	9,000
	C	8,400	900	1,500	9,700	11,200
	D	5,400	3,500	6,400	5,800	3,500
	D	4,500	3,100	3,200	8,000	2,600

TABLE II.—*The final report which would be given for each sample of milk submitted to each laboratory—Continued.*

No.	Laboratory.	L. method, P. media.	L. method, S. media.	S. method, S. media.	S. method, P. media.	S. method, Ex. media.
19 P.....	A	700	1,500	1,600	500	1,500
	A	1,300	2,300	4,200	200	1,400
	B	1,300	1,400	2,300	900	1,400
	B	500	500	500	200	600
	C	3,000	2,900	4,000	7,800	(—)
	C	7,000	4,400	8.	6,200	4,500
20 P.....	D	1,000	1,000	1,400	900	1,000
	D	600	200	2,000	1,400	2,100
	A	300	1,500	800	750	700
	A	200	2,100	2,500	700	5,400
	B	500	1,000	1,500	700	1,700
	B	500	900	700	500	400
21 P.....	C	5,500	2,100	2,600	5,000	5,200
	C	6,000	3,000	2,500	6,400	5,400
	D	(?)	100	100	300	800
	D	500	300	1,200	3,200	200
	A	2,700	2,400	900	400	1,600
	A	200	500	1,200	1,400	300
22 P.....	B	1,100	1,700	700	500	300
	B	300	900	6,000	700	700
	C	5,300	1,200	4,000	12,300	7,000
	C	4,300	1,900	1,200	1,900	5,500
	D	5,500	2,000	800	700	800
	D	300	2,800	800	2,000	2,800
23 P.....	A	1,200	1,200	3,300	2,600	3,400
	A	500	4,100	3,800	1,400	1,500
	B	700	1,100	900	600	700
	B	700	900	1,300	900	1,000
	C	5,900	4,000	6,200	7,100	7,600
	C	6,700	4,700	5,900	6,500	8,300
24 P.....	D	600	300	1,900	1,200	1,700
	D	900	1,100	2,500	2,500	900
	A	4,000	1,300	3,000	2,600	2,800
	A	(?)	700	1,200	700	2,300
	B	1,100	1,600	2,600	8,000	3,100
	B	(—)	1,500	2,000	6,300	5,500
25 P.....	C	6,200	2,400	3,400	6,800	4,600
	C	11,000	2,200	1,700	8,000	6,700
	D	(?)	100	400	1,200	1,000
	D	3,900	1,000	1,000	2,500	1,300
	A	4,000	1,100	500	800	300
	A	100	300	1,800	2,100	1,700
26 P.....	B	6,600?	7,200	800	400	400
	B	500	(—)	600	400	400
	C	9,700	10,400	15,200	1,200	10,400
	C	8,700	1,500	1,400	6,700	5,400
	D	1,500	100	900	2,000	1,500
	D	500	500	800	2,200	1,000
27 C.....	A	300	600	2,200	300	1,200
	A	300	3,400	3,700	1,500	2,000
	B	300	(—)	2,300	600	800
	B ¹	900	1,800	300	2,000	600
	D ¹	2,000	2,400	3,000	2,000	2,000
	D ¹	200	500	4,200	3,000	800
28 P.....	D	500	600	3,000	3,100	1,300
	D	800	1,800	3,000	200	1,900
	A	100	1,000	3,700	500	400
	A	200	3,500	2,700	200	1,600
	B	10,000	22,000	4,400	1,400	4,900
	B	1,800	2,500	3,500	2,300	3,400
29 P.....	C	9,000	5,800	4,800	4,300	6,200
	C	8,500	1,400	6,500	4,500	6,000
	D	700	4,700	5,800	700	900
	D	600	3,400	3,800	800	1,200
	A	100	5,100	700	700	1,000
	A	400	2,400	2,100	400	700
30 P.....	B	1,500	2,200	1,100	800	1,300
	B	2,600	5,000	600	400	700
	C	2,900	2,000	3,000	3,700	5,900
	C	8,400	6,400	7,000	10,400	5,000
	D	4,200	2,300	2,600	4,000	2,000
	D	800	1,000	3,400	1,200	2,200

¹ By mistake sent to D instead of C.

TABLE II.—*The final report which would be given for each sample of milk submitted to each laboratory—Continued.*

No.	Laboratory.	L. method, P. media.	L. method, S. media.	S. method, S. media.	S. method, P. media.	S. method, Ex. media.
28 P.....	A	500	11,000	1,600	600	900
	A	2,000	2,000	700	600	1,600
	B	1,400	1,100	1,200	1,100	1,200
	B	1,200	1,400	900	1,100	600
	C	3,200	100	1,200	4,000	3,200
	C	1,400	600	2,000	3,800	3,800
	D	4,300	800	1,500	4,600	600
29 P.....	D	3,300	800	1,600	2,600	600
	A	500	1,200	100	100	4,000
	A	1,800	3,500	2,800	200	2,600
	B	1,800	1,300	1,700	(—)	2,000
	B	4,500	3,700	1,800	1,700	1,500
	C	2,300	(—)	2,200	4,400	5,700
	C	3,700	1,200	2,000	2,000	5,200
30 P.....	D	3,100	1,600	1,700	1,200	1,900
	D	1,900	1,600	2,200	4,100	2,600
	A	100	(?)	300	600	3,000
	A	(?)	(?)	(?)	200	300
	B	3,000	1,700	4,000	700	600
	B	1,800	1,700	1,600	3,000	1,700
	C	1,400	1,000	400	4,100	5,000
31 P.....	C	700	1,000	S.	1,800	S.
	D	2,700	1,500	6,000	14,800	700
	D	11,200	1,400	700	12,800	200
	A	500	3,000	2,200	200	100
	A	700	3,000	1,000	500	1,000
	B	700	1,100	700	600	500
	B	5,100	6,700	7,500	6,800	6,100
32 C.....	C	4,000	S.	S.	300	5,000
	C		Missing.			
	D	4,300	800	1,500	4,600	600
	D	9,000	3,400	9,000	16,400	900
	A	1,200	2,100	900	1,800	6,100
	A	3,000	400	2,700	(—)	(—)
	B	1,000	1,600	1,500	1,600	1,600
33 C.....	B	1,100	1,500	4,100	1,100	1,700
	C	3,500	4,000	5,100	2,100	3,700
	C	1,800	2,000	4,200	2,000	4,200
	D	1,500	2,600	4,200	2,300	3,100
	D	900	3,000	3,500	3,700	1,800
	A	2,000	2,300	2,400	500	1,400
	A	500	2,000	4,300	1,400	1,300
34 C.....	B	2,700	3,800	2,000	1,300	1,600
	B	1,000	1,700	4,200	4,600	5,500
	C	3,200	4,100	2,300	5,000	6,600
	C	900	3,200	2,300	2,200	4,600
	D	300	2,400	2,300	1,600	2,800
	D	1,300	2,000	3,600	3,200	2,800
	A	1,900	2,000	2,900	(—)	900
35 P.....	A	2,000	2,400	1,500	1,000	400
	B	800	4,800	1,800	1,600	1,700
	B	1,500	2,500	(—)	1,900	2,200
	C	4,000	1,900	2,900	2,000	3,000
	C	1,300	1,000	3,600	1,400	2,500
	D	600	3,300	2,800	4,500	2,100
	D	1,600	3,000	3,000	3,600	2,600
36 R.....	A	1,000	200	1,200	500	400
	A	3,300	14,000	7,800	6,700	8,000
	B	800	1,100	3,200	2,100	2,200
	B	40,000	(—)	1,400	3,800	700
	C	15,300	10,200	(?)	22,400	15,300
	C	5,300	(?)	9,500	13,200	11,000
	D	17,000	2,700	5,500	17,400	3,000
36 R.....	D	1,200	600	7,000	12,100	18,300
	A	20,000	35,000	52,000	25,000	27,000
	A	29,000	74,000	49,000	28,000	21,000
	B	8,500	8,600	9,400	6,600	5,900
	B	25,000	35,000	20,000	16,000	20,000
	C	61,000	80,000	120,000	129,000	136,000
	C	86,000	94,000	95,000	108,400	94,000
36 R.....	D	8,800	8,000	26,000	27,000	61,000
	D	46,000	26,000	33,000	55,000	59,000

TABLE II.—*The final report which would be given for each sample of milk submitted to each laboratory—Continued.*

No.	Laboratory.	L. method, P. media.	L. method, S. media.	S. method, S. media.	S. method, P. media.	S. method, Ex. media.
37 R.....	A	20,000	60,000	42,000	23,000	25,000
	A	22,000	41,000	49,000	12,500	14,000
	B	23,000	22,000	17,000	15,000	20,000
	B			64,000	16,000	44,000
	C	90,000	100,000	108,000	96,000	102,000
	D ¹	95,000	115,000	47,000	48,000	54,000
	D	36,000	42,000	69,000	43,000	58,000
38 R.....	D	44,000	72,000	72,000	40,000	53,000
	A	10,000	66,000	31,000	10,400	31,000
	A	8,300	34,000	(?)	32,000	41,000
	B	43,000	46,000	71,000	3,500	2,700
	B	36,000	34,000	14,000	16,000	28,000
	C	94,000	88,000	95,000	100,000	102,000
	C	96,000	91,000	92,000	106,000	103,000
39 R.....	D	67,000	63,000	76,000	31,000	43,000
	D	60,000	63,000	61,000	20,000	42,000
	A	23,000	35,000	54,000	14,000	33,000
	A	56,000	86,000	53,000	48,000	88,000
	B	88,000	95,000	30,000	27,000	27,000
	B	128,000	29,000	102,000	95,000	71,000
	C	52,000	45,000	72,000	44,000	75,000
40 R.....	C	200,000	107,000	250,000	90,000	200,000
	D	72,000	70,000	36,000	38,000	62,000
	D	65,000	66,000	114,000	44,000	76,000
	A	32,000	65,000	77,000	35,000	85,000
	A	1,100	58,000	38,000	4,100	23,000
	B	92,000	100,000	150,000	119,000	127,000
	B	71,000	36,000	115,000	105,000	69,000
41 R.....	C	300,000	240,000	270,000	280,000	370,000
	C		Missing.			
	D	60,000	57,000	14,000	90,000	95,000
	D	120,000	220,000	44,500	63,000	53,000
	A	31,000	50,000	31,000	7,900	18,000
	A	1,000?	89,000	92,000	70,000	100,000
	B	92,000	74,000	115,000	122,000	69,000
42 R.....	B	161,000	132,000	100,000	111,000	97,000
	C	560,000	180,000	240,000	360,000	370,000
	C	130,000	130,000	240,000	210,000	240,000
	D	75,000	55,000	27,000	44,000	38,000
	D	65,000	93,000	40,000	36,000	22,000
	A	30,000	71,000	19,000	14,500	48,000
	A	35,000	62,000	71,000	19,000	65,000
43 R.....	B	14,600	43,000	67,000	76,000	61,000
	B	35,000	18,000	15,400	58,000	37,000
	C	44,000	57,100	98,400	95,000	106,900
	C	100,000	100,000	200,000	70,000	110,000
	D	49,000	54,000	6,000	5,700	59,000
	D	70,000	40,000	(?)	(?)	65,000
	A	41,000	54,000	83,000	29,000	82,000
44 P.....	A	22,000	27,000	62,000	36,000	63,000
	B	78,000	90,000	227,000	78,000	151,000
	B	73,000	117,000	223,000	52,000	78,000
	C	370,000	560,000	450,000	700,000	600,000
	C	270,000	280,000	590,000	350,000	450,000
	D	160,000	410,000	230,000	122,000	203,000
	D	127,000	120,000	40,000	50,000	200,000
45 C.....	A	1,700	21,000	20,000	16,000	13,200
	A	3,000	6,100	14,000	13,000	21,000
	B	20,000	120,000?	11,000	70,000	30,000?
	B	5,200	1,800	11,000	9,000	10,000
	C	29,000	39,000	42,000	24,000	48,000
	C	42,900	39,000	37,000	32,900	38,400
	D	19,100	20,000	20,000	11,500	19,700
45 C.....	D	20,000	45,000	18,000	22,000	17,000
	A	10,000	6,500	13,000	3,800	11,800
	A	1,200	8,700	17,000	3,600	20,000
	B	5,000	(-)	(-)	4,800	(-)
	B	1,000	(-)	(-)	(?)	12,000
	C	36,200	29,400	22,400	20,000	28,500
	C	24,800	28,000	20,000	30,000	28,900
45 C.....	D	2,300	8,400	12,400	11,400	14,900
	D	2,100	9,000	11,800	10,000	6,000

¹ By error analyzed by D instead of C.

TABLE II.—*The final report which would be given for each sample of milk submitted to each laboratory—Continued.*

No.	Laboratory.	L. method, P. media.	L. method, S. media.	S. method, S. media.	S. method, P. media.	S. method, Ex. media.
46 P.....	A	13,000	17,000	38,000	30,000	26,000
	A	32,000	25,000	25,000	30,000	34,000
	B	20,000	2,300	23,000	62,000	28,000
	B	19,000	1,800	17,000	40,000	14,000
	C	73,600	22,000	34,200	71,200	45,500
	C	42,000	26,000	38,500	129,300	35,000
	D	330,000	17,300	28,000	21,000	31,000
47 R.....	D	44,000	40,000	24,000	23,000	36,000
	A	1,600	2,100	20,000	44,000	44,000
	A	35,000	11,200	45,000	68,000	68,000
	A	25,000	1,500	32,000	36,000	10,000
	B	42,000	1,000	1,000	77,000	74,000
	B	114,000	240,000?	79,000	32,000	127,000
	B	(—)	(—)	200	14,000	13,000
48 R.....	C	150,000	5,100	8.	126,000	96,000
	C	100,000	67,000?	14,400	99,000	192,000
	C	146,000	10,400	9,000	140,000	104,000
	D	69,000	25,000	15,600	96,000	35,000
	D	100?	500	72,000	400	54,000
	D	200	400	300	76,000	88,000
49 R.....	A	350,000	628,000	448,000	190,000	210,000
	A	104,000	452,000	580,000	520,000	370,000
	B	30,000	19,000	52,000	203,000	400,000
	B	76,000	11,000	184,000	118,000	381,000
	C	1,610,000	1,540,000	1,470,000	1,070,000	1,410,000
	C	2,410,000	2,330,000	1,450,000	1,430,000	1,800,000
	D	128,000	126,000	525,000	400,000	610,000
50 R.....	D	720,000	248,000	330,000	240,000	550,000
	A ¹	48,000	80,000	65,000	45,000	36,000
	A	6,800	62,000	57,000	30,000	94,000
	B	8,200	6,600	24,000	17,000	28,000
	B	13,000	12,000	41,000	15,000	22,000
	C	121,200	102,000	126,000	147,000	132,000
	C	97,000	87,000	116,000	112,000	122,000
51 R.....	D	201,000	130,000	81,000	71,000	70,000
	A	25,600	50,000	99,000	24,000	50,000
	A	24,600	52,000	65,000	33,000	20,400
	A	15,000	51,000	52,000	39,000	48,000
	B	16,000	17,000	58,000	17,000	17,500
	B	7,700	17,400	26,600	10,600	54,000
	C	150,000	180,000	154,000	135,000	184,000
52 R.....	C	50,000	137,000	166,000	133,000	100,000
	D	9,400	57,000	12,300	38,000	104,000
	D	34,000	52,000	(?)	59,000	70,000
	A	20,000	34,000	25,000	11,000	29,000
	A	31,000	49,000	73,000	18,000	14,000
	B	4,100	21,000	41,000	31,000	36,000
	B	7,800	20,000	14,000	13,200	18,600
53 R.....	C	104,600	76,000	124,000	108,000	142,000
	C	105,000	107,000	109,000	107,400	111,000
	D	14,000	33,000	80,000	71,000	87,000
	D	105,000	(?)	100,000?	61,000	73,000
	A	38,000	102,000	45,000	13,200	19,000
	A	15,000	45,000	54,000	34,000	53,000
	B	24,000	5,200	18,700	9,300	23,000
54 R.....	B	7,900	13,900	72,000	19,000	39,000
	C	129,000	144,000	140,800	136,000	181,000
	C	112,000	109,000	109,000	104,000	120,000
	D	83,000	107,000	95,000	74,000	50,000
	D	92,000	112,000	91,000	95,000	47,000
	A	10,000	26,000	61,000	85,000	18,000
	A	36,000	40,000	55,000	17,300	84,000
55 R.....	B	11,400	35,000	36,000	21,300	43,000
	B	16,000	48,000	48,000	32,000	50,000
	C	83,000	119,000	102,000	176,000	122,000
	C	131,000	97,000	109,000	106,000	146,000
	D	30,000	72,000	90,000	85,000	53,000
	D	113,000	180,000	121,000	81,000	40,000
	A	12,400	60,000	120,000	16,100	480,000?
56 R.....	A	10,000	50,000	94,000	24,000	50,000
	B	6,800	23,000	58,000	11,900	32,000
	B	11,300	28,000	30,000	19,000	13,700
	C	166,000	125,000	159,000	140,000	125,000
	C	226,000	168,000	206,000	116,000	131,000
	D	65,000	50,000	86,000	27,000	84,000
	D	24,000	78,000	92,000	77,000	74,600

¹ By error examined by D.² By error examined by A.

TABLE II.—The final report which would be given for each sample of milk submitted to each laboratory—Continued.

No.	Laboratory.	L. method, P. media.	L. method, S. media.	S. method, S. media.	S. method, P. media.	S. method, Ex. media.
55 R.	A	23,000	51,000	75,000	66,000	84,000
	A	41,000	38,000	71,000	14,000	47,000
	B	11,300	64,000	495,000	308,000	290,000
	B	5,800	12,400	4,700	2,400	2,900
	C	58,000	120,000	116,000	109,000	162,000
	C	43,000	141,000	123,000	125,000	139,000
	D	48,000	72,000	106,000	82,000	43,000
56 R.	D	122,000	177,000	100,000	85,000	43,000
	A	34,000	51,000	58,000	31,000	44,000
	A	110,000	46,000	80,000	27,000	120,000
	A	41,000	41,000	42,000	(—)	50,000
	B	7,700	41,800	70,000	19,000	39,000
	B	8,900	14,400	43,000	17,800	45,000
	B	9,900	31,000	11,000	11,000	10,000
57 R.	C	230,000	202,000	200,000	95,000	170,000
	C	87,000	99,000	160,000	78,000	221,000
	C	202,000	115,000	260,000	155,000	260,000
	D	40,000	72,000	98,000	106,000	52,000
	D	6,000	52,000	75,000	19,000	80,000
	D	25,000	39,000	102,000	55,000	145,000
	D	42,000	436,000	350,000	190,000	520,000
58 R.	A	121,000	490,000	415,000	72,000	280,000
	A	100,000	41,000	120,000	230,000	320,000
	B	106,000	103,000	77,000	190,000	280,000
	C	2,190,000	1,660,000	1,410,000	1,340,000	1,830,000
	C	2,000,000	2,110,000	1,980,000	1,850,000	2,000,000
	D	560,000	300,000	530,000	350,000	440,000
	D	400,000	218,000	382,000	420,000	670,000
59 P.	A	34,000	450,000	650,000	81,000	153,000
	A	218,000	533,000	445,000	330,000	306,000
	B	(—)	(—)	64,000	35,000	80,000
	B	125,000	69,000	220,000	80,000	480,000
	C	1,240,000	2,000,000	1,210,000	1,530,000	1,780,000
	C	1,570,000	1,250,000	2,160,000	1,650,000	2,000,000
	D	77,000	71,000	136,000	480,000	160,000
600 P.	D	380,000	220,000	490,000	405,000	300,000
	A	30,000	157,000	230,000	98,000	79,000
	A	1,400,000	(—)	860,000	315,000	325,000
	B	1,330,000	2,460,000	1,400,000	2,250,000	2,540,000
	B	1,400,000	980,000	580,000	295,000	343,000
	C	1,400,000	1,100,000	1,900,000	2,500,000	2,190,000
	C	2,450,000	3,700,000	2,630,000	2,500,000	2,000,000
61 R.	D	880,000	132,000	(?)	73,000	360,000
	D	2,000,000	1,600,000	335,000	1,070,000	280,000
	A	250,000	62,000	72,800	40,000	66,000
	A	315,000	680,000	230,000	56,000	234,000
	A	130,000	1,250,000	2,500,000	1,200,000	1,500,000
	B	2,170,000	850,000	1,600,000	1,000,000	1,120,000
	B	1,000,000	1,140,000	2,400,000	160,000	1,800,000
620 R.	C	3,500,000	3,400,000	2,430,000	2,200,000	1,700,000
	C	2,800,000	900,000	1,600,000	2,920,000	2,410,000
	C	1,900,000	2,100,000	3,200,000	3,420,000	3,490,000
	C	2,800,000	2,400,000	1,140,000	3,800,000	2,400,000
	D	790,000	880,000	1,630,000	1,320,000	1,320,000
	D	480,000	125,000	(?)	23,000	3,700,000
	D	118,000	(?)	220,000	400,000	240,000
61 R.	A	14,000	251,000	580,000	420,000	600,000
	A	185,000	50,000	235,000	200,000	300,000
	B	1,330,000	1,400,000	1,460,000	1,080,000	1,410,000
	C	1,610,000	1,170,000	1,480,000	1,550,000	1,970,000
	D	750,000	710,000	600,000	420,000	510,000
	D	44,000	77,000	85,000	145,000	392,000
	D	4,500,000	6,750,000	8,100,000	7,500,000	6,500,000
620 R.	A	6,800,000	5,650,000	1,300,000	8,750,000	8,700,000
	A	Error.	1,000,000	3,200,000	8,000,000	5,600,000
	B	6,500,000	480,000	4,800,000	16,000,000	4,000,000
	C	35,840,000	38,720,000	38,720,000	26,080,000	39,520,000
	C	34,000,000	51,600,000	55,200,000	33,600,000	43,200,000
	D	6,000,000	6,000,000	4,800,000	4,800,000	4,800,000
	D	10,800,000	(—)	12,000,000	7,200,000	(—)

TABLE II.—*The final report which would be given for each sample of milk submitted to each laboratory—Continued.*

No.	Laboratory.	L. method, P. media.	L. method, S. media.	S. method, S. media.	S. method, P. media.	S. method, Ex. media.
630 R.....	A	9,000,000	19,000,000	20,000,000	9,500,000	6,000,000
	A	8,500,000	12,200,000	13,750,000	18,900,000	18,000,000
	B	9,600,000	2,250,000	5,000,000	1,600,000	6,400,000
	B	4,000,000	3,900,000	2,000,000	56,000,000	8,000,000
	C	68,400,000	79,200,000	85,600,000	75,600,000	67,200,000
	C	96,000,000	105,000,000	120,000,000	118,000,000	118,800,000
	D	(?)	(?)	(?)	(?)	18,000,000
640 R.....	D	(?)	(?)	18,000,000	(?)	7,200,000
	A	5,400,000	21,800,000	28,000,000	12,000,000	5,800,000
	A	15,800,000	7,200,000	16,200,000	40,800,000	14,200,000
	B	8,600,000	9,400,000	10,200,000	7,800,000	10,400,000
	B	6,600,000	7,000,000	6,300,000	3,600,000	8,800,000
	C	65,000,000	54,000,000	58,320,000	58,800,000	63,000,000
	C	56,000,000	44,800,000	52,000,000	54,000,000	64,800,000
650 R.....	D	24,000,000	15,000,000	15,600,000	15,000,000	24,000,000
	D	9,000,000	12,000,000	(—)	9,600,000	9,000,000
	A	940,000	2,960,000	4,800,000	500,000	410,000
	A	710,000	7,100,000	7,300,000	2,000,000	740,000
	A	2,000,000	9,800,000	6,900,000	2,400,000	3,200,000
	B	3,400,000	3,700,000	700,000	720,000	430,000
	B	2,900,000	4,200,000	5,000,000	1,310,000	1,800,000
660 R.....	B	1,500,000	4,000,000	760,000	426,000	750,000
	C	1,700,000	27,000,000	31,000,000	30,000,000	(—)
	C	25,800,000	31,600,000	35,000,000	28,000,000	30,000,000
	C	32,000,000	48,000,000	40,000,000	32,000,000	45,000,000
	D	870,000	9,000,000	7,200,000	7,200,000	6,000,000
	D	2,000,000	1,800,000	(?)	1,800,000	6,000,000
	D	24,000,000	15,000,000	18,000,000	4,800,000	(?)
670 R.....	A	10,800,000	6,400,000	9,600,000	6,400,000	7,400,000
	A	20,000,000	1,200,000	320,000	8,200,000	12,000,000
	B	2,900,000	4,200,000	3,000,000	1,500,000	2,900,000
	B	4,200,000	4,000,000	3,000,000	3,700,000	3,800,000
	C	80,000,000	51,000,000	57,000,000	55,120,000	55,000,000
	C	64,000,000	70,400,000	80,320,000	40,000,000	62,720,000
	D	6,000,000	6,000,000	5,400,000	4,200,000	3,000,000
680 S.....	D	5,400,000	5,400,000	4,800,000	6,000,000	6,000,000
	A	1,640,000	4,000,000	1,000,000	240,000	1,080,000
	A	2,000,000	7,000,000	9,100,000	3,100,000	4,000,000
	B	(—)	(—)	1,800,000	390,000	1,000,000
	B	650,000	2,000,000	3,300,000	1,000,000	1,450,000
	C	40,000,000	48,000,000	56,000,000	37,000,000	38,000,000
	C	23,000,000	32,000,000	26,000,000	21,000,000	(—)
690 S.....	D	12,000,000	18,000,000	18,000,000	2,470,000	(—)
	D	3,000,000	10,200,000	15,000,000	12,000,000	3,000,000
	A	4,050,000	6,200,000	4,550,000	1,210,000	1,680,000
	A	3,400,000	8,000,000	4,400,000	4,600,000	4,700,000
	B	1,840,000	440,000	320,000	1,900,000	1,360,000
	B	1,500,000	800,000	550,000	6,700,000	5,400,000
	C	8,440,000	9,440,000	8,760,000	10,640,000	11,400,000
700 S.....	C	10,800,000	6,300,000	7,850,000	10,800,000	7,600,000
	D	6,600,000	4,800,000	3,600,000	4,200,000	3,600,000
	D	9,000,000	7,200,000	6,600,000	(—)	(—)
	A	5,400,000	3,680,000	5,600,000	4,200,000	6,800,000
	A	3,400,000	11,000,000	7,600,000	7,200,000	4,100,000
	B	4,800,000	4,200,000	6,160,000	7,200,000	6,000,000
	B	7,880,000	3,000,000	1,700,000	2,360,000	4,200,000
710 S.....	C	65,000,000	99,000,000	90,000,000	68,000,000	86,000,000
	C	66,000,000	90,000,000	85,000,000	45,000,000	58,000,000
	D	12,000,000	9,600,000	7,200,000	9,600,000	9,600,000
	D	42,000,000	(—)	(—)	10,800,000	(—)
	A	64,000,000	13,400,000	10,200,000	14,000,000	9,600,000
	A	3,800,000	9,600,000	40,000,000	8,000,000	6,200,000
	B	6,680,000	14,600,000	11,000,000	7,700,000	12,600,000
720 S.....	B	5,600,000	3,600,000	2,200,000	6,400,000	2,600,000
	C	169,700,000	189,000,000	165,000,000	149,200,000	180,000,000
	C	160,000,000	160,000,000	156,000,000	160,000,000	170,000,000
	D	15,000,000	(—)	12,000,000	12,000,000	24,000,000
	D	(—)	(—)	(—)	(—)	90,000,000

Analysis of the Results of the Above Tables.

Grade of accuracy in results of analysis.—That discrepancies in the results of analyses of samples of milk from the same bottle, analyzed by different laboratories, should occur is to be expected. It must be recognized that bacteriological analyses, since they deal with discrete, solid objects, can not be compared with chemical analyses, where solutions are concerned. Bacteria can not be distributed through the milk with absolute uniformity, and, moreover, they have a tendency to clump, so that two samples from the same bottle can hardly ever be alike in bacterial content. Besides these primary differences there must be recognized irregularities in technique, which may add to the variation in results. No extensive series of experiments such as these has been before carried out to determine how great irregularities must be expected.

A glance at the above tables emphasizes the occurrence of irregularities, and indeed they seem to be greater than most would have anticipated. Nearly any one of the tests will show these irregularities, and they are so evident that there is no need to call attention to any special instances. From these irregularities two general conclusions must be reached.

1. Under the ordinary conditions of laboratory analyses, results of different laboratories in analyzing two different samples from the same bottle of milk can not be relied upon as giving any close approximation to accuracy.

2. Single analyses of a milk sample can not be relied upon. Not only is every laboratory liable to make some unrecognized slip in technique, so as to give a single widely divergent result, but even where there are no palpable errors, individual results occasionally diverge noticeably from the general average. Hence, no milk analysis should be reported upon except as the result of the average of two or more tests. If four or five analyses are made, the results may be regarded as moderately accurate; but under ordinary conditions of laboratory work, discrepancies are so great that reliance should not be placed upon a single plate count.

FACTORS PRODUCING VARIATIONS.

Variations in medium.—The Standard Methods of Milk Analysis places great emphasis on the exact composition and method of making the culture media, and far less emphasis on the manipulation of the specimen and the general technique of laboratory methods. The three different media used in this series of tests are sufficient to determine whether variations in media had any considerable effect upon the result. A cursory glance at the tables fails to show that any one of these media gives uniformly a higher or a lower count than the others, and to determine the actual result it is necessary, therefore, to resort to

a careful comparison of averages. This was done as follows: Each test was calculated separately, the figures obtained by all of the laboratories with each milk sample, when tested upon each of the three media, being added together and the sum divided by the number of tests made of each sample. This gave the average count obtained by all of the laboratories by the use of each one of the three media. The figures thus obtained were compared to see which medium gave the highest count for the whole series combined, the assumption being, of course, that the medium that gave the highest count was, other things being equal, the best. For all of the tests in which analyses from all the laboratories were complete enough to make a fair calculation, the results were as follows:

In 30 samples the standard medium gave the highest count.

In 27 milk samples the dilute standard medium gave the highest count.

In 20 samples the extract medium gave the highest count.

By this method of calculation the standard medium was thus shown to be slightly superior to the others.

A different attempt to determine the value of the media was made by averaging the total numbers of bacteria found in each of the media. In making this calculation, samples of less than 10,000 bacteria were calculated by themselves, since manifestly one or two of the results which were calculated in millions added to these would outweigh the significance of the lower figures. By this method the results were as follows:

Average of all samples below 10,000 by the standard medium, 3,158.

Average of all samples below 10,000 by the dilute medium, 4,042.

Average of all samples below 10,000 by the extract medium, 3,980.

By this calculation the dilute medium gave the highest average and the standard the lowest.

The figures of the plates giving numbers in tens and in hundreds of thousands were so divergent that an average would be misleading and consequently was not made. An average of the counts of all giving figures of over 1,000,000 resulted about the same for the standard and the dilute medium, with a slightly higher average for the extract medium.

From these tests it is clear that, so far as numbers are concerned, no one medium has any decided advantage over another. Any differences that were due to the media were vastly less than those that were due to other factors. Evidently the variations in the result in the above tables were not primarily due to differences in composition of the media, but must have been due to some differences in technique used in the four laboratories or to inherent variations in samples.

It should be further noticed that the dilute medium above tested had an acid reaction of only 0.3, which is much below that of the

reaction adopted for the standard media. Inasmuch, however, as this dilute medium gave practically the same counts as those of the other media, it is evident that a variation in the acidity between 0.3 and 1.5 makes practically no difference in the results.

Spreaders.—One further conclusion from the use of these media was noticeable. The size of the colonies which grow in the dilute media was considerably smaller than those in the standard media, making these plates possibly a little harder to count. On the other hand, there was very much less difficulty experienced in the appearance of spreaders. In these tests, 128 spreaders were reported from plates made with standard medium, 23 from plates made with the dilute medium, and 21 from the plates made with the extract. In the reduction of spreaders, therefore, the dilute medium and the extract medium seem to be decidedly superior to the standard medium made from beef infusion.

COMPARISON OF THE RESULTS OF THE DIFFERENT LABORATORIES WITH EACH OTHER.

The total numbers reported by each laboratory upon each sample of milk were added together and the sum divided by the number of separate analyses made of each sample. This gave the average number of bacteria per c. c. reported from each laboratory for each sample of milk. In this calculation the figures obtained by the standard method only were used. The results of these analyses are as follows:

Laboratory C gave counts which emphatically exceeded the other laboratories, while laboratory B in most cases gave the lowest counts. In actual figures:

Laboratory C gave the highest counts in all but 11 samples.

Laboratory D gave the highest count in 7 samples.

Laboratory A gave the highest count in 3 samples.

Laboratory B gave the highest count in 1 sample only.

Laboratory B gave the smallest count in 59 samples.

Laboratory A gave the smallest count in 34 samples.

Laboratory D gave the smallest count in 8 samples.

In no instance did laboratory C give the lowest count.

The counts of the laboratories were in general in the order B, A, D, C, and this order was repeated over and over again. Out of 96 samples, comprising all in which this calculation could be fairly made, this order was repeated 47 times, and it therefore represented the average order of these laboratories.

In order to show the relation of the laboratories to each other in this series of tests Table III has been prepared. In this table there are given the average figures that each laboratory obtained from each of the samples of milk submitted, and in the fifth column is given the extent of the variation found in the reports of the different laboratories when analyzing unknown duplicate samples of milk. This

variation was obtained by dividing the highest figure reported by any laboratory by the lowest figure reported by any laboratory upon duplicate samples. In this table the figures are arranged in five sets corresponding to five successive test days, and they include some of the analyses that were not listed in Table II. In some cases this variation was found to be almost unbelievably great.

TABLE III.—Averages obtained by each laboratory upon each sample tested in the three media by standard method, arranged in regular series according to the reports from laboratory A.

Laboratory A.	Laboratory B.	Laboratory C.	Laboratory D.	Variation.	Laboratory A.	Laboratory B.	Laboratory C.	Laboratory D.	Variation.
950	1,350	2,780	980	2.9	2,100	4,590	5,200	1,230	2.4
975	850	1,300	950	1.4	2,660	900	6,930	1,800	7.7
1,150	2,770	2,250	1,900	2.4	24,400	19,300	80,000	53,000	4.1
1,000	2,250	1,150	2,330	2	29,000	22,500	99,000	45,500	4.4
1,850	700	7,710	2,700	7.7	33,600	14,700	115,000	43,500	7.8
1,875	3,820	4,970	1,810	2.7	49,000	29,000	75,000	52,500	2.6
2,100	1,975	7,375	8,020	4	1,350,000	7,850,000	58,000,000	12,000,000	42.9
2,550	3,850	15,100	2,400	6.3	2,350,000	930,000	22,000,000	4,000,000	24.6
2,700	2,175	7,580	3,180	3.4	3,080,000	1,500,000	35,000,000	14,000,000	23.3
3,080	3,760	10,700	4,120	2.8					
3,325	1,200	5,750	4,780	4.9	1,010	5,330	8,130	7,880	7.4
3,375	3,375	18,200	5,780	5.3	1,780	-----	7,400	2,720	4.2
3,900	2,100	7,210	4,420	3.2	1,830	1,530	3,500	2,030	1.9
4,850	3,980	7,910	6,050	2	1,830	2,550	7,900	7,350	4.3
5,050	1,975	5,750	5,100	2.9	3,450	2,950	5,510	4,210	1.8
27,700	29,500	73,300	55,850	2.6	3,900	750	3,460	1,420	5.2
42,000	20,000	77,300	76,500	3.8	4,100	2,230	14,300	8,880	6.4
46,200	30,000	101,000	88,000	3.3	7,500	1,200	2,200	1,200	6.2
					17,200	760	12,300	900	22.6
760	2,960	2,725	2,100	3.4	28,300	25,600	115,000	58,000	4.4
880	1,930	2,820	5,880	6.7	35,600	13,300	138,000	101,000	3.8
1,000	1,010	3,000	1,910	3	36,100	30,100	132,000	75,300	4.4
1,160	3,700	(?)	5,500	5	42,300	30,500	145,000	54,200	4.6
1,340	1,840	2,760	3,100	2.3	53,300	38,300	108,700	78,300	2.3
1,630	1,740	3,585	2,285	2.2	54,600	21,500	124,000	66,000	5
1,830	5,500	7,800	1,860	4.3	71,100	45,000	133,000	61,400	2.9
2,130	2,000	3,500	2,300	1.7	130,000	27,400	146,000	73,300	5.9
2,130	2,960	2,725	2,100	1.3	8,850,000	4,650,000	72,000,000	11,600,000	15.4
2,285	3,810	7,210	3,400	3.4	14,600,000	7,000,000	161,000,000	12,000,000	23.4
2,440	2,320	3,560	3,100	1.5					
6,610	3,200	3,860	2,710	2.4	1,100	620	7,600	6,100	12.2
39,200	53,000	113,000	39,900	3	1,250	1,586	9,650	1,325	7.7
45,500	137,000	306,000	59,600	6.7	1,810	1,375	7,380	4,400	5.4
52,600	55,000	121,000	61,000	2.3	1,840	1,000	7,450	4,575	7.4
53,000	1,016,000	415,000	51,000	8	1,875	1,500	3,900	1,690	2.6
59,100	135,000	523,000	180,000	8.8	2,050	2,560	2,880	2,260	1.4
318,000	1,230,000	2,230,000	350,000	7.1	2,600	3,430	7,300	3,460	2.8
6,720,000	1,600,000	2,700,000	690,000	4	11,560	8,000	24,800	11,080	3.1
					16,200	23,500	38,800	18,030	2.3
720	3,500	3,600	2,700	5	25,100	57,000	55,000	67,500	2.6
800	610	6,900	2,560	8.6	30,500	30,600	58,600	27,100	2.1
930	1,710	5,260	1,350	5.6	40,400	198,000	1,730,000	498,000	43.2
1,000	3,100	3,000	5,200	5.2	40,700	46,300	78,400	48,800	1.9
1,030	3,200	5,000	630	5.3	337,000	158,000	1,700,000	357,000	4.4
1,200	500	6,700	1,400	13.4	386,000	226,000	1,639,000	442,000	7.3
1,200	4,550	5,200	1,230	4.3	533,000	214,000	1,600,000	360,000	6.5
1,500	3,310	5,381	2,200	3.5	1,430,000	13,160,000	97,100,000	Unc.	(?)
1,580	980	5,000	1,700	5.4	3,500,000	2,700,000	8,190,000	4,500,000	3.3
1,810	1,160	2,500	2,080	2.2	8,500,000	33,000,000	39,000,000	6,000,000	7.3

VARIATION FACTOR IN EACH LABORATORY.

An endeavor was made to determine the range of variation in each laboratory when analyzing duplicate samples of milk. To obtain this figure the highest number reported by each laboratory upon duplicate samples was divided by the lowest number reported. Thus if the figures agreed exactly, as they should in theory, the result

would be 1, while if one analysis of duplicate samples gave twice as high a figure as the others, the variation figure would be 2. Evidently, the smaller the variation figure the more uniform are the results of the analysis of the duplicate samples. The average variation figures of all of the samples analyzed by each laboratory were then added together and the sum was divided by the number of samples reported upon, the result giving what may be called the average laboratory variation. In determining this average variation certain reports were excluded which were manifestly due to laboratory errors. The results of all of those which were included were as follows:

Average variation in laboratory A, second test day, *4.6.
Average variation in laboratory B, second test day, 2.6.
Average variation in laboratory C, second test day, 3.1.
Average variation in laboratory D, second test day, 7.7.
Average variation in laboratory A, third test day, 5.9.
Average variation in laboratory B, third test day, 3.2.
Average variation in laboratory C, third test day, 2.2.
Average variation in laboratory D, third test day, 3.7.
Average variation in laboratory A, fourth test day, 5.2.
Average variation in laboratory B, fourth test day, 2.7.
Average variation in laboratory C, fourth test day, 1.5.
Average variation in laboratory D, fourth test day, 2.9.
Average variation in laboratory A, fifth test day, 3.5.
Average variation in laboratory B, fifth test day, 6.1.
Average variation in laboratory C, fifth test day, 2.4.
Average variation in laboratory D, fifth test day, 3.7.

Combining all of these figures together so as to give a general average for each laboratory for the whole series of reports so far as they were complete, the following result was obtained:

General average variation of laboratory A, 4.8.
General average variation of laboratory B, 3.6.
General average variation of laboratory C, 2.1.
General average variation of laboratory D, 4.5.

The large variation shown in some cases was due to one or two widely divergent results. If these had been excluded, the several laboratories would have been much closer together. This variation of nearly 500 per cent in some cases, is certainly wider than would have been expected, and wider than should be permissible. It is manifestly desirable to determine if possible the cause of the variations.

THE PLATINUM LOOP VERSUS THE PIPETTE METHOD OF DILUTION.

Without going into details, it may be stated that the figures in Table II show that the results obtained by the loop method were slightly more irregular than those obtained by the pipette method.

* The first test day is omitted from this list, since the data are incomplete.

The variations in duplicate samples made by the loop method were somewhat larger than those made by the standard method of dilution by pipette; the differences, however, are not very great, and are less than the irregularities arising from other factors. The general conclusion to be reached from this test is that the loop method is less regular than the pipette method, and that diluting the milk samples by means of a pipette should be adhered to as a standard method rather than the somewhat shorter method of using a measured platinum loop. It is evident, however, that the difference between the results obtained by using the pipette and the loop are not sufficient to explain the uniformly larger results reported by the laboratory C. The loop did not give results either uniformly larger or smaller than the pipette method, but simply more irregular.

CAUSES OF VARIATIONS.

It is quite evident from the above tables that there must be some differences in technique used by the different laboratories that will explain the divergencies in the results thus given. The practical uniformity in the figures obtained from the use of widely divergent media shows that the differences are not due to the media, and it hence follows that they must be due either to differences in samples sent to the different laboratories or to differences in technique. The next step in this series of tests was to visit the different laboratories and to watch the method of manipulation adopted in each in the handling of the milk samples. It became apparent at once after these visits were made that there were at least two differences in technique which might explain the irregularities, at least to a certain extent.

1. The Standard Methods of Milk Analysis recommends 25 shakes of the milk sample before dilution. It was found that there was considerable variation both in the number of shakes and in the violence of the shaking in these four laboratories.

2. The method of counting was found to be quite different in the four laboratories.

In the Standard Methods, under the directions for counting, is the following sentence: "Colonies too small to be seen with the naked eye or with a slight magnification shall not be considered in the count." That the exact meaning of this sentence is difficult to determine is shown by the fact that the four laboratories concerned in this test had interpreted it in four different ways. In one laboratory no magnifying power was used; in the second a magnifying power was used occasionally; in the third a magnifying power of $2\frac{1}{2}$ diameters was used for all plates; and in the fourth a magnifying power of $3\frac{1}{2}$ diameters was used for some plates, but not for others. Although

it was insisted by some engaged in these tests that in most cases the naked eye could see as many colonies as the microscopic lens, it is perfectly evident that this would not uniformly be the case. By the use of the naked eye alone persons who are nearsighted will get a higher count when small colonies are concerned than those who are farsighted, and when the plates are highly seeded the attempt to count the colonies without a lens will surely give a different count from one made with a magnifying power.

There were certain other slight differences in laboratory technique that did not seem to be of any special significance.

SECOND SERIES OF TESTS.

The object of the second series of tests was so far as possible to avoid the recognized sources of discrepancy in the first series, for the purpose of seeing whether the wide variations that had appeared in the first series would continue to appear when the methods of manipulation in the laboratory were brought more nearly to a uniform basis. In this second series also it was determined to make a test of two or three other factors which it was thought possibly might contribute to the accuracy of the result. The second test was planned as follows:

Plan for Tests.

1. *Uniformity of shaking.*—To insure as close a uniformity in shaking as possible, a visit was made to each laboratory, and a demonstration was made by the referee to the assistants who were performing the work, to show them exactly the amount and the vigor of shaking to be adopted in this series of tests. It was stipulated that each sample and each dilution bottle should be shaken 25 times. In each case the shake was to be a double shake, in which the bottle was to pass through a distance of at least a foot.

2. *Care in following out technique.*—In the first series of tests the laboratories were expected to follow out their ordinary routine without change; in the second series the assistants in each laboratory were carefully informed about the scope and purpose of the test, and were given to understand that the accuracy of their work was under observation. It was thought that this would bring about in some cases a more careful attention to the details of the technique, and thus reduce irregularities that might otherwise creep in.

3. *Method of counting.*—Each of the laboratories in question was instructed to obtain an engravers' lens magnifying $3\frac{1}{2}$ diameters, and was directed to count all plates by the use of this lens.

4. *Method of inoculating the plates.*—Three different methods of plate inoculation were in use in these laboratories. One laboratory inoculated test tubes containing 10 c. c. of melted agar with 1 c. c. of

the diluted milk and then rolled the tubes between the hands, finally pouring the whole into a petri dish. Others placed the 1 c. c. of diluted milk into a petri dish and poured melted agar upon it, subsequently gently agitating the whole to distribute the milk uniformly over the plate. In some cases the agar was poured from test tubes each containing 10 c. c., while in other cases the same method was used except that the melted agar was poured from a flask instead of from test tubes, the eye of the assistant being trusted to obtain about 10 c. c. of agar in each plate. The advantage of this method over that of using test tubes is chiefly in the line of saving in time and the use of glassware; though not recognized in the Standard Methods it has become quite widely used in routine laboratories. To test the accuracy of these methods each laboratory used the first and third of these above described, and two laboratories used also the second.

5. *Check on the accuracy of counting.*—In order to determine whether the differences in the counts were actually differences in the method or in accuracy of counting, in the second series of tests each plate was counted by two laboratories. After the plates had been counted by the first laboratory they were carried over to a second, and immediately counted in that laboratory; the reports of the two counts were then sent to the referee without conference between the laboratories concerned. This it was thought would determine the personal error in counting.

For this series of tests a smaller number of samples were submitted to the different laboratories, 15 in all being furnished, but these 15, as will be seen from the tables, contained a wide variety of milk samples, ranging from those with a very low bacteria count to those with the bacteria in millions.

The following table gives a condensed summary of the results obtained by the series of tests. In this table the same method of determining the final report was used as in the first series, namely, plates containing less than 20 and more than 900 bacteria per c. c. being excluded in the final result, except in cases where these plates alone could be used. The "A method" referred to in the tables indicates the inoculation of the plates by the dilution with the agar poured directly into the plates from flasks. The "C method" was the same except that the agar was poured from tubes, and the "B method" was the method of inoculating the tubes with the diluted milk, rolling them and subsequently pouring the whole into the petri dish. It should be stated also that though this table contains the most significant data, it does not contain all of the data obtained in the test. The first three columns in all cases were the counts made by the laboratory that made the plates, the second three columns the counts of the second laboratory to which the same plates were submitted.

TABLE IV.

	Counted by labora- tory—	A method.	B method.	C method.	Counted by labora- tory—	A method.	B method.	C method.
71 R.....	A	4,600	3,000	2,300	C	4,800	2,400	9,200
	A	5,100	5,400	3,200	C	1,200	4,000	5,000
	B	800	400	(-)	D	600	200	(-)
	B	1,100	4,100	(-)	D	300	(?)	(-)
	C	4,000	8,000	13,200	A	3,200	7,300	10,700
	C	11,000	10,000	3,500	A	3,500	10,900	15,000
	D	4,300	2,800	(-)	B	5,700	3,400	(-)
72 P.....	D	2,000	2,100	(-)	B	1,400	2,600	(-)
	A	29,000	26,000	24,000	C	28,000	24,500	28,000
	A	15,000	16,700	10,000	C	22,000	8,000	13,500
	B	1,300	7,700?	(-)	D	100	6,500	(-)
	B	3,100	36,400?	(-)	D	300	100	(-)
	C	11,000	16,500	20,200	A	16,200	15,700	23,300
	C	18,000	12,500	15,300	A	18,500	9,600	29,000
73 C.....	D	4,900	40,000	(-)	B	3,000	36,000	(-)
	D	35,000	29,000	(-)	B	30,000	33,000	(-)
	A	3,100	2,700	2,900	C	2,400	3,500	2,600
	A	2,700	2,700	2,400	C	2,300	2,200	3,000
	B	2,100	3,800	(-)	D	800	1,200	(-)
	B	4,500	3,300	(-)	D	2,700	1,500	(-)
	C	3,000	8,000	3,000	A	3,400	3,600	(-)
74.....	C	2,500	1,500	2,500	A	2,700	1,600	3,000
	D	3,000	2,800	(-)	B	10,900	3,600	(-)
	D	2,300	2,500	(-)	B	2,200	2,600	(-)
	A	38,000	36,000	44,000	C	37,000	53,000	54,000
	A	39,500	34,000	38,000	C	37,000	45,000	43,000
	B	100,000	101,000	(-)	D	65,000	105,000	(-)
	B	93,000	133,000	(-)	D	55,000	86,000	(-)
75 R.....	C	47,000	510,000	380,000	A	36,000	231,000	353,000
	C	44,000	360,000	311,000	A	56,000	500,000	509,000
	D	32,000	220,000	(-)	B	26,000	38,000	(-)
	D	200,000	229,000	(-)	B	216,000	263,000	(-)
	A	3,200,000	2,520,000	5,000,000	C	3,800,000	4,000,000	5,600,000
	A	6,280,000	4,800,000	4,030,000	C	5,500,000	5,800,000	6,800,000
	B	8,750,000	6,020,000	(-)	D	6,600,000	6,000,000	(-)
76 R.....	B	7,520,000	19,460,000	(-)	D	(-)	12,600,000	(-)
	C	2,300,000	3,200,000	3,600,000	A	4,600,000	4,200,000	4,050,000
	C	6,400,000	1,200,000	5,200,000	A	4,400,000	2,570,000	4,400,000
	D	2,630,000	2,330,000	(-)	B	2,560,000	2,300,000	(-)
	D	3,150,000	2,050,000	(-)	B	2,860,000	3,330,000	(-)
	A	5,340,000	5,700,000	5,800,000	C	8,800,000	5,600,000	5,800,000
	A	6,200,000	7,000,000	7,100,000	C	5,900,000	6,900,000	5,000,000
77 R.....	B	15,540,000	14,560,000	(-)	D	6,000,000	6,000,000	(-)
	B	18,550,000	17,350,000	(-)	D	13,200,000	15,000,000	(-)
	C	10,100,000	10,000,000	10,000,000	A	11,750,000	15,600,000	10,800,000
	C	8,400,000	7,000,000	8,600,000	A	6,400,000	7,250,000	6,200,000
	D	7,200,000	8,810,000	(-)	B	9,900,000	9,240,000	(-)
	D	9,600,000	8,400,000	(-)	B	11,220,000	9,240,000	(-)
	A	450,000	352,000	410,000	C	320,000	360,000	470,000
78 R.....	A	380,000	300,000	360,000	C	325,000	470,000	340,000
	A	370,000	400,000	360,000	C	435,000	510,000	300,000
	B	1,000,000	601,000	(-)	D	500,000	430,000	(-)
	B	448,000	1,640,000	(-)	D	313,000	841,000	(-)
	B	600,000	1,160,000	(-)	D	440,000	580,000	(-)
	C	475,300	510,000	410,000	A	587,000	480,000	400,000
	C	520,000	520,000	460,000	A	670,000	325,000	565,000
79 R.....	D	350,000	260,000	350,000	A	505,000	600,000	340,000
	D	319,000	340,000	(-)	B	440,000	570,000	(-)
	D	317,000	342,000	(-)	B	390,000	400,000	(-)
	D	234,000	260,000	(-)	B	220,000	200,000	(-)

Summary of the General Conclusions of the Second Series of Tests.

UNIFORMITY OF THE MEDIA.

Samples of the media used by each laboratory were submitted to the referee for examination. These samples were tested first for acidity and were found to agree in acidity to within 0.1 per cent, three of the four media giving exactly 1 per cent acidity and the other 0.9 per cent acid. Each of the four media was then tested by the referee on the same samples of milk. Two samples of raw milk were diluted

with 100 c. c. of water and shaken more thoroughly than usual, so as to give as perfect distribution of bacteria as possible. These were then plated in triplicate plates with each of the three media. The average counts of the three plates gave the following results:

	Laboratory A.	Laboratory B.	Laboratory C.	Laboratory D.
No. 1.....	12,000	15,000	14,000	13,000
No. 2.....	305,000	290,000	280,000	279,000

These results showed that the four samples of media were uniform and gave practically identical results, the variations being only those that were inevitable in examination of different samples of the same milk. The figures may also serve to show how close results may be obtained upon a single sample of milk when media and methods are absolutely uniform and when an average of three plates of each sample is made.

COMPARISON OF DIFFERENT METHODS OF INOCULATION.

The figures in this series of tests showed a very slight superiority of the method of inoculating the tubes directly over the more common method of inoculating plates. The actual results were as follows:

In 30 separate tests the direct plate inoculation gave higher figures.

In 29 separate tests the tube method of inoculation gave the higher figures.

Averaging the total tests of each milk sample, however, showed that the tube inoculation gave the highest counts in five of the milk samples and the direct inoculation in one sample. Among this series of samples was one of cream, and this gave a considerably wider variation in results when the plate was inoculated directly over those obtained when the tubes were inoculated. Only two of the laboratories used the method of inoculating the petri dishes and subsequently pouring the agar from test tubes, so that the results are hardly extensive enough to be of much significance. So far as they go, the inoculation of the plates and the pouring of the plates from flasks gave higher results than the plate inoculation poured from tubes, this result being obtained in 15 samples, while the reverse result was obtained in 5 samples.

The very slight superiority of inoculating tubes directly is hardly sufficient to make it necessary to insist upon the adoption of this method in the place of the common method of inoculating the plate directly, where the latter is preferred. The slightly higher counts are less than the errors due to the irregular counting of the same plates in different laboratories. Where a large amount of routine work is done the saving in labor in the use of flasks rather than test tubes is so great as to make this method preferable, if it is not mani-

festly unreliable. The result of this series of tests shows that the two methods are so close to each other that no insistence should be made upon the method advised by the present Standard Methods of Milk Analysis, and it would seem to be wise to make it permissible to inoculate the petri dish from flasks rather than from test tubes.

UNIFORMITY OF RESULTS.

The results of this series of tests were far more uniform than those of the first series, and may be briefly summarized as follows:

Each of the four laboratories reported four of the samples submitted as containing less than 10,000 bacteria.

Each of the laboratories reported two of the samples as containing between 500,000 and 20,000.

Each of the laboratories reported three samples as containing between 200,000 and 1,000,000, and, with the exception of one report from one laboratory, as containing between 200,000 and 500,000.

Each of the laboratories reported four of the samples as containing above 2,000,000 and less than 20,000,000.

A careful study of all the figures of which the above table is a summary also shows that in general the single analyses of the samples of milk agreed within these limits, and that the above statement applies not simply to averages, but also to individual analyses of separate samples.

The following table gives a condensed summary of the results in a form to make them more easily comparable to each other:

TABLE V.

Numbers	Laboratory.	Average.	General average.	Extremes.
73.....	A	3,930	4,235	2,300- 5,400
	B	1,350		400- 4,100
	C	8,840		3,500- 13,200
	D	2,890		2,000- 4,300
71.....	A	2,750	3,300	2,700- 3,100
	B	3,425		2,100- 4,500
	C	3,410		1,500- 8,000
	D	2,650		2,300- 2,800
72.....	A	20,100	20,700	10,000- 29,000
	B	12,120		1,300- 36,400
	C	23,400		11,000- 20,200
	D	27,200		4,000- 35,000
74 ¹	A	38,279	185,000	34,000- 44,000
	B	106,700		95,000- 133,000
	C	413,000		44,000- 516,000
	D	185,000		32,000- 260,000
77.....	A	375,000	521,000	300,000- 453,000
	B	974,000		448,000-16,400,000
	C	428,000		250,000- 520,000
	D	308,700		234,000- 383,000
75.....	A	6,550,000	7,440,000	2,920,000- 6,280,000
	B	10,440,000		6,020,000-19,460,000
	C	4,400,000		3,200,000- 6,400,000
	D	2,540,000		2,050,000- 3,150,000
76.....	A	6,200,000	10,000,000	5,340,000- 7,100,000
	B	16,600,000		14,500,000- 18,500,000
	C	9,130,000		7,000,000-10,800,000
	D	8,500,000		7,200,000- 9,600,000

¹ No 74 was a sample of cream.

Individual variations.—Isolated individual variations have not been wholly eliminated from this series of results, but they are less noticeable than in the previous tests. The individual variations do not appear in the summary table given above, but are very evident in the whole series of figures as presented. In some cases they were clearly due to errors in counting, for it was manifest that occasional dirt specks in the media were counted as colonies by one laboratory, whereas the second laboratory counting the same plates did not count them at all. It was also noticeable that most of the large individual variations were from the reports on the samples of milk that contained few bacteria. This is easily explained by the inevitable variation in the uniformity of distribution of bacteria through the milk.

Comparison of the results of the four laboratories.—In this series of tests no one of the laboratories gave a uniformly higher count than the others, as was the case in the first series. The almost uniform order in which the laboratories reported their results in the previous series was not shown in this series at all.

The analyses reported by the four laboratories upon this series of samples were very much more uniform than in the first series. They not only agreed more closely with each other, but the different reports from the same laboratory upon duplicate samples of milk agreed more closely. Although what has been termed in a preceding page the "average variation" (obtained by dividing the highest result by the lowest in each sample) ranged from two up to six in the first series, in this series the average variations in the different laboratories were, laboratory A, 1.8, laboratory B, 1.9, laboratory C, 2.2, laboratory D, 1.6. In obtaining these figures, however, one or two quite divergent results were omitted from two of the laboratories, since they were manifestly errors in counting; but even if they were included the results would be very much closer than in the previous series.

VARIATIONS IN THE COUNTING OF DUPLICATE PLATES.

Interesting data are found by comparing the duplicate counts made by the different laboratories of identical plates. It is practically never that the duplicate counts agree, and in some cases the discrepancy was as great as the irregularities arising from all other sources. There was clearly a difference in the method adopted in counting the plates; in some laboratories the whole plates being counted, in others only a part counted and the whole estimated. An estimation of the number of colonies was naturally made, however, only where the plates were very heavily seeded. The details of these duplicate counts were as follows:

Laboratory A and C counted each other's plates, and in this case laboratory A obtained the higher count in 48 plates and laboratory C the higher count in 39 plates.

When counting the plates of laboratory C, laboratory A obtained in 53 plates a higher count than that reported by laboratory C.

When counting plates of laboratory A, laboratory C obtained in 34 plates a count higher than that reported by laboratory A.

In both cases each laboratory obtained a smaller count on its own plates in a larger number of instances than it obtained a larger count.

Laboratory B and laboratory D exchanged plates. In this series laboratory B obtained a higher count in 49 plates, laboratory D a higher count in 9 plates.

In only one set did laboratory D report higher counts than laboratory B upon the same plates.

In 73 cases the second laboratory counting the plates gave a higher count than the first laboratory, and in 71 plates the first laboratory reported the higher numbers. The amount of variation that would be found in duplicate counts of the same plates can be seen by examining Table IV, and it will be noticed that in some cases it was as great as 100 per cent, although as a rule the differences were less than this.

A FIVE-DAY COUNT.

In order to determine whether any considerable increase in bacteria would be found by leaving the plates in incubation for five days instead of two, each of these plates, after being counted at the end of 48 hours, was set aside in the laboratory at room temperature for three days, when a second count was made. The results showed that the five-day count gave in most cases a slightly higher number of bacteria than the two-day count. This was not, however, uniform, and in some cases the five-day count was not as high as the two-day count. This was probably to be accounted for by the fact that some small specks were counted at the end of two days which were not real colonies, and this was discovered at the end of the five-day period. In some cases, however, the smaller five-day count was due to the fact that small colonies were overgrown by the increase in size of the larger colonies, and therefore were not seen at the end of the five days. The difference between the two-day count and the five-day count was not great enough to make any difference in the grading of any milk sample, and in general was less than the differences that could be seen in duplicate counts of the same plates made by two different laboratories on the same day.

CREAM.

Among the lot of specimens submitted in this case there was one specimen of cream, and this gave results in the different laboratories far less uniform than those obtained in milk No. 74. This was of course to be expected, since there would be a less uniform distribution of bacteria in the sample. The analyses of laboratories A and B were, however, as close together as their analyses of milk, although they gave lower counts on this sample of cream than did the other two laboratories.

It was noticeable that the cream analyses made by inoculating the plates and subsequently pouring the agar into the tubes were much less uniform than those which were made when the diluted cream was put into the melted tube, rolled, and subsequently poured into the petri dish. This fact is doubtless explained by the greater difficulty of uniformly distributing the bacteria in cream by simply pouring the melted agar upon the diluted sample.

SHAKING WITH BEADS.

In submitting samples No. 77 one of the three samples was taken from a bottle of milk after a simple agitation, and then a considerable number of sterile beads were placed in the bottle and the whole was subjected to an extremely violent shaking. After this two other samples were removed and sent to each of the laboratories. The three samples of 77 were therefore of the same milk, but one of them had been subjected to simple agitation and the others to a vigorous shaking with beads. The figures show that the vigorous shaking with the beads made practically no difference in the results. In each case the first sample of the three was the one that was submitted without the shaking with beads, and it can be seen that the figures here are no smaller than those obtained in the other two samples.

THIRD SERIES OF TESTS.

The third series of tests was for the purpose of giving additional data concerning the limits of variation of the different laboratories, under conditions as nearly as possible identical, and also to test out several additional points in practical routine.

Effect of shaking.—The failure to obtain any difference in results in the test previously described, when the milk was shaken thoroughly with sterile beads, raised the question as to whether the shaking of the milk samples really made any noticeable difference in the final analysis. In the third test each laboratory was instructed to make one series of plates from each of the samples submitted, using simply a gentle agitation so as to mix the milk without shaking it, and to make a second series after giving it a normal vigorous shaking. The two plates were to be made at once under identical conditions in all other respects.

The use of domestic peptone in comparison with that of Witte.—The difficulty of obtaining Witte's peptone at the present time has led to an extension of the use of domestic peptone. The Digestive Ferment Co., of Detroit, submitted to the laboratories samples of four different lots of peptone made at different times, and two of these lots were distributed to the four laboratories for this test. Separate media were made both with the Witte and with each sample of the Detroit peptone and each of the milk samples submitted was tested thus by three media, identical in all respects except the peptone.

Effect of icing.—It is frequently necessary to keep a sample of milk for some hours before it can be submitted to laboratory analysis. To determine whether this can be done without materially affecting the results one series of tests was made as follows: From each of a series of milk bottles after thorough mixing there was removed one set of samples which was distributed to the test laboratories at 1 o'clock p. m. Immediately afterwards each bottle of milk was placed in a mixture of ice and water, the temperature of which was practically freezing, the result being that the milk was cooled to a temperature of slightly over 32° F. in a very short time. It was kept at this temperature until 9 o'clock the next morning. A second series of samples was then taken from each bottle and distributed to the different laboratories for a second series of plates. A comparison of the two results would show the general relation of the effect of keeping samples of milk for a period of 21 hours or thereabouts at a temperature of practically freezing.

Direct microscopic examination of milk.—In this series of tests there was also obtained a new set of data upon the bacterial examination of milk by means of the direct microscopic method. During the last few years a large amount of interest has developed concerning this method of bacteriological analysis of milk, which is calculated to give quicker results than the plate method; but no extended series of tests had been made to compare the accuracy of the bacteriological analysis by plate methods and by the microscopic method as modified in recent improvements. This series of experiments offered, therefore, an unusual opportunity for testing out the accuracy and availability of the direct microscopic method. Dr. R. S. Breed, of the Geneva Experiment Station, who has been more responsible than anyone else in perfecting and advocating the direct microscopic method, joined the other laboratories in this series of tests. Dr. Breed came to New York and made a series of smears of the milk samples submitted to laboratory A, while the various laboratories were making their plates. At the same time, the laboratory of the Board of Health made a similar series of smears from milk samples received by them. These smears were counted, and reports were sent to the referee without any comparison with the plate counts which had been obtained. The reports upon the bacteriological analysis by the microscopic method, therefore, were quite independent.

In reporting the results of the microscopic analyses in this series of tests there was a discrepancy between the method of counting adopted by the board of health laboratory and by Dr. Breed. The Board of Health laboratory reported the total number of individual bacteria that could be counted. Dr. Breed also gave a report of the total number of individual bacteria that could be found upon his smears; but in addition to this he gave another figure of much more significance in comparing the microscopic count with the plate count.

Every bacteriologist recognizes that a clump of bacteria in a milk sample will produce only one colony, whether it be made up of a single bacterium or of thousands. The bacteria in milk samples are more or less in clumps, and if the attempt is made to compare the results of the microscopic count with that of the plate count it is evident that the only significant figure in the microscopic count would be the number of groups or clumps that could be found, and not the number of individual bacteria. In the reports obtained from Dr. Breed there were given, in addition to the individual bacteria, the clumps which could be recognized by the direct microscopic examination.

In this series of tests, as in the last, each plate, after being counted, was passed along to a second laboratory, where a count was made. In the following table, for direct comparison, both counts are given, one immediately under the other, the first report being that of the laboratory making the plate and the second the count of the second laboratory to which the plates were submitted.

Three of the laboratories made a set of parallel tests with a medium which contained only one-half the quantity of peptone and of beef extract that is contained in the standard. The results with this medium were irregular and are given in the column headed "Dil. shake."

In the following table the columns headed "Det. A" and "Det. B" give the results obtained with the Detroit peptone as compared with the Witte peptone which was used in the standard given in the first column.

TABLE VI.

Laboratory.	Plates 2 p. m.			After 21 hours icing.		
	Stan.	Det. A.	Det. B.	S. Mix.	S. shake.	Dil. shake.
No. 78:						
A rep.....	1,650,000	2,010,000	1,880,000	1,500,000	5,300,000	3,450,000
D rep.....	1,800,000	2,640,000	1,970,000	1,950,000	4,840,000	1,300,000
A rep.....	1,540,000	1,470,000	880,000	1,550,000	2,840,000	(?)
D rep.....	1,690,000	2,530,000	2,100,000	2,610,000	5,470,000	(?)
A rep.....	470,000	350,000	490,000	1,890,000	7,200,000	3,650,000
D rep.....	510,000	290,000	460,000	2,830,000	4,880,000	2,210,000
B rep.....	860,000	457,000	660,000	1,800,000	4,900,000	.....
C rep.....	600,000	362,000	590,000	1,600,000	2,750,000	.....
B rep.....	260,000	77,000	1,960,000	3,340,000	6,400,000	.....
C rep.....	750,000	100,000	1,310,000	2,350,000	4,000,000	.....
B rep.....	1,250,000	1,180,000	1,400,000	2,050,000	1,560,000	.....
C rep.....	900,000	1,360,000	1,920,000	1,820,000	4,500,000	.....
SHAKEN PLATES OF LABORATORY C NOT COUNTED BY LABORATORY B.						
C rep.....	625,000	600,000	663,000	.....	.....	.....
C rep.....	1,220,000	1,310,000	1,200,000	.....	.....	.....
C rep.....	2,400,000	2,300,000	2,300,000	.....	.....	.....
UNSHAKEN PLATES.						
C rep.....	600,000	800,000	540,000	2,100,000	5,700,000	5,300,000
B rep.....	530,000	700,000	620,000	4,800,000	5,600,000	5,600,000
C rep.....	570,000	600,000	540,000	2,250,000	8,750,000	6,000,000
B rep.....	750,000	810,000	680,000	2,160,000	10,700,000	7,600,000
C rep.....	580,000	1,100,000	770,000	4,000,000	4,750,000	4,250,000
B rep.....	480,000	1,160,000	840,000	4,500,000	6,240,000	4,250,000
D rep.....	800,000	1,520,000	1,100,000	970,000	910,000	(?)
A rep.....	450,000	860,000	880,000	970,000	910,000	(?)
D rep.....	460,000	800,000	900,000	1,200,000	67,000	45,000
A rep.....	470,000	910,000	960,000	1,220,000	1,040,000	35,000
D rep.....	430,000	400,000	380,000	1,540,000	5,300,000	.....
A rep.....	260,000	339,000	270,000	1,050,000	4,100,000	.....

TABLE VI—Continued.

Laboratory.	Plates 2 p. m.			After 21 hours icing.		
	Stan.	Det. A.	Det. B.	S. Mix.	S. shake.	Dil. shake.
UNSHAKEN PLATES—contd.						
No. 79:						
A rep.....	15,850,000	10,760,000	9,800,000	2,720,000	10,600,000	7,850,000
D rep.....	19,200,000	10,800,000	10,700,000	2,670,000	17,500,000	12,500,000
A rep.....	14,200,000	10,720,000	6,440,000	7,100,000	10,230,000	8,400,000
D rep.....	12,200,000	10,200,000	9,000,000	4,140,000	13,400,000	16,400,000
B rep.....	5,000,000	4,500,000	4,300,000	920,000	8,600,000	.....
C rep.....	13,000,000	13,600,000	4,000,000	1,000,000	11,000,000	.....
B rep.....	11,000,000	7,500,000	5,000,000	900,000	11,900,000	.....
C rep.....	10,180,000	11,000,000	9,300,000	1,350,000	23,000,000	.....
THE SHAKEN PLATES NOT COUNTED BY LABORATORY B.						
C rep.....	28,000,000	3,000,000	2,500,000	.....	.....	.....
C rep.....	8,200,000	15,300,000	9,600,000	.....	.....	.....
UNSHAKEN PLATES.						
C rep.....	6,320,000	6,000,000	7,400,000	4,850,000	24,000,000	29,000,000
B rep.....	5,200,000	5,000,000	5,800,000	1,430,000	32,000,000	35,000,000
C rep.....	3,710,000	3,240,000	2,900,000	5,000,000	19,000,000	18,000,000
B rep.....	4,200,000	2,250,000	3,080,000	6,000,000	10,800,000	6,400,000
D rep.....	1,700,000	2,610,000	1,300,000	830,000	3,270,000	(?)
A rep.....	4,760,000	2,470,000	1,760,000	2,360,000	4,400,000	(?)
D rep.....	2,800,000	3,030,000	2,900,000	920,000	3,500,000	.....
A rep.....	1,940,000	2,760,000	2,660,000	740,000	2,280,000	.....
No. 80:						
A rep.....	58,000	50,000	63,000	30,000	67,000	83,000
D rep.....	75,000	73,000	70,000	40,000	89,000	74,000
A rep.....	89,000	79,000	54,000	34,000	57,000	36,000
D rep.....	108,000	109,000	100,000	71,000	48,000	40,000
B rep.....	61,000	75,000	70,000	40,000	69,000	.....
C rep.....	68,000	65,000	61,000	46,000	61,000	.....
B rep.....	60,000	70,000	47,000	44,000	63,000	.....
C rep.....	55,000	103,000	49,000	45,000	65,000	.....
SHAKEN PLATES NOT COUNTED BY LABORATORY B.						
C rep ¹.....	.....	Missing	.....	.....	.....	.....
C rep.....	132,000	120,000	121,000	.....	.....	.....
UNSHAKEN PLATES.						
C rep.....	92,000	72,000	79,000	53,000	120,000	105,000
B rep.....	91,000	83,000	83,000	55,000	148,000	168,000
C rep.....	60,000	57,000	50,000	65,000	127,000	135,000
B rep.....	62,000	61,000	58,000	74,000	260,000	224,000
D rep.....	62,000	72,000	67,000	28,000	30,000	9,000
A rep.....	40,000	44,000	40,000	33,000	22,000	8,000
D rep.....	62,000	66,000	65,000	25,000	17,000	12,000
A rep.....	48,000	50,000	32,000	21,000	17,000	22,000
No. 81:						
A rep.....	350,000	386,000	198,000	250,000	470,000	300,000
D rep.....	2,440,000	400,000	270,000	390,000	500,000	350,000
A rep.....	354,000	520,000	190,000	190,000	375,000	150,000
D rep.....	343,000	390,000	170,000	226,000	318,000	225,000
B rep.....	160,000	92,000	84,000	98,000	143,000	.....
C rep.....	165,000	120,000	90,000	90,000	161,000	.....
B rep.....	116,000	100,000	112,000	104,000	95,000	.....
C rep.....	160,000	125,000	80,000	100,000	99,000	.....
SHAKEN PLATES NOT COUNTED BY LABORATORY B.						
C rep.....	350,000	300,000	660,000	.....	.....	.....
C rep.....	560,000	545,000	580,000	.....	.....	.....
UNSHAKEN PLATES.						
C rep.....	302,000	586,000	472,000	418,000	630,000	520,000
B rep.....	306,000	520,000	530,000	518,000	813,000	485,000
C rep.....	310,000	332,000	365,000	286,000	530,000	433,000
B rep.....	540,000	285,000	410,000	424,000	680,000	641,000
D rep.....	110,000	130,000	116,000	55,000	85,000	22,000
A rep.....	85,000	177,000	145,000	46,000	62,000	90,000
D rep.....	110,000	168,000	130,000	61,000	40,000	28,000
A rep.....	96,000	124,000	117,000	52,000	38,000	31,000

TABLE VI—Continued.

Laboratory.	Plates 2 p. m.			After 21 hours icing.		
	Stan.	Det. A.	Det. B.	S. Mix.	S. shake.	Dil. shake.
UNSHAKEN PLATES—contd.						
No. 82:						
A rep.	4,900	3,600	3,000	6,600	5,100	4,500
D rep.	8,400	4,400	4,300	5,500	12,000	5,600
A rep.	6,100	3,900	2,300	3,400	3,700	3,900
D rep.	6,500	30,400	5,700	4,200	4,600	5,200
B rep.	4,500	5,200	3,600	3,400	11,600	.....
C rep.	4,200	4,500	3,100	3,400	8,000	.....
B rep.	15,200	5,200	4,000	2,800	2,300	.....
C rep.	4,300	6,300	3,900	3,400	3,400	.....
SHAKEN PLATES NOT COUNTED BY LABORATORY B.						
No. 82:						
C rep.	4,800	5,500	4,700	.....	.....	.....
C rep.	4,800	8,500	4,600	.....	.....	.....
UNSHAKEN PLATES.						
No. 82:						
C rep.	4,300	6,100	4,500	4,300	5,600	4,100
B rep.	3,300	4,200	3,100	4,600	7,100	3,900
C rep.	3,600	14,000	3,400	3,300	5,400	4,500
B rep.	3,600	13,500	3,600	4,600	6,500	4,600
D rep.	2,100	4,400	3,300	2,500	1,900	2,400
A rep.	2,160	3,800	2,700	2,500	1,600	1,700
D rep.	1,200	3,500	4,000	2,100	2,600	1,000
A rep.	5,300	2,800	2,100	1,900	2,300	1,300
No. 83:						
A rep.	16,700	16,100	11,400	7,800	5,900	6,800
D rep.	17,100	14,600	11,000	13,100	12,500	11,900
A rep.	16,600	19,200	13,400	6,900	10,900	12,200
D rep.	17,000	17,300	13,400	12,600	19,200	18,100
B rep.	15,900	16,800	12,500	8,000	12,100	.....
C rep.	15,400	13,500	12,500	8,200	12,900	.....
B rep.	9,000	12,000	12,300	12,000	9,800	.....
C rep.	16,800	20,000	12,000	14,000	10,800	.....
SHAKEN PLATES NOT COUNTED BY NORTH.						
No. 83:						
C rep.	23,000	25,000	24,000	.....	.....	.....
C rep.	21,000	23,000	22,000	.....	.....	.....
UNSHAKEN PLATES.						
No. 83:						
C rep.	11,000	12,000	12,700	13,000	25,000	25,000
B rep.	13,100	10,800	13,800	13,000	26,000	14,000
C rep.	13,500	11,100	11,900	10,900	20,000	17,000
B rep.	13,100	10,800	13,800	10,300	26,000	17,200
D rep.	10,100	14,000	11,900	5,900	6,200	1,300
A rep.	6,500	7,300	11,800	4,900	4,900	1,400
D rep.	9,700	10,200	11,600	5,100	7,000	.....
A rep.	5,900	6,400	7,100	4,000	4,200	.....
No. 84:						
A rep.	14,700	13,700	12,700	4,500	10,300	5,600
D rep.	15,000	12,100	14,100	6,400	10,500	8,600
A rep.	8,600	10,300	7,100	5,800	7,300	9,700
D rep.	10,200	10,200	8,000	6,700	11,100	19,400
B rep.	17,000	10,000	14,000	6,200	6,000	.....
C rep.	16,000	12,000	14,000	9,000	12,000	.....
B rep.	9,100	12,500	9,600	5,000	9,800	.....
C rep.	7,100	102,000	9,500	5,600	10,400	.....
SHAKEN PLATES NOT COUNTED BY LABORATORY B.						
No. 84:						
C rep.	15,600	14,400	13,800	.....	.....	.....
C rep.	16,500	15,900	14,900	.....	.....	.....
UNSHAKEN PLATES.						
No. 84:						
C rep.	7,500	8,000	13,200	8,400	16,000	15,800
B rep.	14,000	8,600	15,300	9,600	18,400	9,200
C rep.	6,800	6,300	6,000	22,000	26,000	16,500
B rep.	6,400	7,000	6,200	19,800	24,000	7,600
D rep.	6,000	9,600	8,500	2,000	5,900	5,500
A rep.	8,900	7,400	5,600	1,500	4,000	700
D rep.	5,500	8,200	7,500	3,400	5,300	.....
A rep.	4,300	5,200	5,300	2,600	4,700	.....

General Summary of Third Series.

VARIATIONS IN RESULTS.

In this series the results are in about as close agreement as they were in the second series, as above reported. Although there are individual discrepancies and some variations in averages, in general they agree with each other fairly well. This is shown best in the tables, VII and VIII, which at the same time show the degree of accuracy that may be expected when different laboratories analyze samples of the same bottle of milk. In this table are given the general averages of the tests of the same bottle of milk and also the general average that each laboratory has obtained in the analysis of the samples submitted to it. In the first column are given the averages obtained with media made with the Witte peptone (marked Stan) and with the Detroit peptone of two lots (marked A and B).

TABLE VII.—Summary of averages from table.

No.	Media.	Plate counts.			Microscopic group count.	
		Shaken.	Unshaken.	After icing, shaken.	Before icing.	After icing.
80	Stan.....	70,000	44,000	78,000	29,000	22,000
	Det. A.....	75,000				
	Det. B.....	65,000				
78	Stan.....	920,000	2,170,000	4,300,000	1,170,000	3,400,000
	Det. A.....	1,000,000				
	Det. B.....	1,100,000				
81	Stan.....	217,000	151,000	200,000	245,000	219,000
	Det. A.....	250,000				
	Det. B.....	210,000				
82	Stan.....	4,200	3,600	4,500	1,700	10,000
	Det. A.....	10,900				
	Det. B.....	3,200				
83	Stan.....	12,600	9,300	12,500	7,500	12,700
	Det. A.....	15,400				
	Det. B.....	14,500				
84	Stan.....	11,000	7,400	11,400	4,500	7,700
	Det. A.....	11,700				
	Det. B.....	10,300				
79	Stan.....	10,600,000	2,800,000	11,400,000	10,000,000	2,770,000
	Det. A.....	9,000,000				
	Det. B.....	6,000,000				

The following summary gives the general average of all the analyses of each sample of milk and also the average obtained by each of the laboratories. It will serve, therefore, to show how close to the general average were the results of the individual laboratories.

TABLE VIII.—Averages of shaken plates.

Number.	General average.	Laboratory A.	Laboratory B.	Laboratory C.	Laboratory D.
80.....	70,000	82,000	61,000	132,000	53,000
78.....	920,000	1,300,000	770,000	1,400,000	480,000
81.....	217,000	338,000	150,000	450,000	98,000
82.....	4,200	6,500	7,000	4,800	2,700
83.....	12,600	16,800	14,300	22,500	8,000
84.....	11,000	12,100	12,300	16,000	6,100
79.....	10,000,000	15,400,000	10,500,000	18,000,000	2,770,000

COMPARISON OF THE RESULTS OF DIFFERENT LABORATORIES.

In these tables is seen far less divergence in the results than in the first series of experiments, but at the same time it will be noticed that there is still a somewhat general relation of the laboratories to each other. It will be seen from the summary table just given that laboratory D in every case gave a noticeably lower count than either of the other three laboratories. No one of the other three, however, gave uniformly higher results, as in the first series of tests. The actual figures were as follows:

Laboratory C, in 77 per cent of its tests, was above the general average; laboratory A in 70 per cent was above the general average; laboratory B in 51 per cent was above the general average, while laboratory D was above the general average in only 5 per cent. On the other hand, laboratory D was below the general average in 95 per cent of its counts, while laboratory C was below the average in only 23 per cent of its counts.

Range of variation.—From the last table it will be seen that the range of variation in the laboratories is considerable, even under the most uniform conditions and when averages are used. There is a variation in some cases of 300 per cent between the lowest average and the highest average analyses of these samples of milk from the same bottle.

Variation in samples.—One of the most significant conclusions of this series is that samples obtained from the same bottle of milk clearly vary noticeably in the number of bacteria which they contain. For example, No. 78, Table VI, represents three different samples from the same bottle of milk, distributed to each of the four laboratories. The bottle of milk containing these samples was first thoroughly mixed by pouring it back and forth from one bottle to another several times, so as to produce as thorough a mixture as possible, without, however, any particular shaking. The samples were then taken one after the other by means of a sterile pipette. By examining Table VI it will be seen that the three samples received by laboratory A gave analyses in round numbers, 1,600,000, 1,500,000, and 400,000. The sample that gave 400,000 gave practically the same number in all of the three media that were used in this test, and also gave essentially the same results when the plates were counted by both laboratories A and D, thus showing that there was an actual difference in the number of colonies on the plate, and not simply a difference in the method of counting. This shows that there was an actual difference in the number of bacteria in the sample, and that the difference in analysis was not due simply to laboratory technique. It is also interesting to note that the microscopic examination made by Breed of this same sample of milk in laboratory A gave a smaller bacterial count of groups in this sample than it did in the other two

samples of the same bottle of milk. These facts together show beyond question that two samples of milk from the same bottle, even after thorough mixing, may vary quite noticeably in their bacterial content.

Variations in duplicate counts.—A comparison of the figures of duplicate counts of the same plates is interesting as showing again that even when great care is used two laboratories will not in all cases obtain counts agreeing with each other very closely. In a few cases the differences were extreme, due to a failure of one laboratory to recognize small specks as colonies, or to the second laboratory's counting dirt specks as colonies. But aside from these differences there is a general variation in the duplicate counts of the same plates which ranges from 100 per cent downward, although it is rarely over 50 per cent. From this we must conclude that an allowance of at least 50 per cent of error must be made for the personal factor in counting the plates.

Domestic peptone compared to Witte's peptone.—The results of these plates show that the two samples of domestic peptone gave practically the same results as those of Witte. In this series the averages of the three media were very close to each other, the average obtained by the Witte being actually between the average obtained from the two Detroit peptones. The differences were so slight, however, as to indicate no advantage of the one peptone over the other.

Icing.—These tables show that there is a very slight increase in bacteria in 21 hours when the milk samples are placed in the mixture of melting ice and water. In the freshest samples of milk, where the bacteria were few in the original sample, the increase during the 21 hours is so slight as to be negligible. Sometimes there is no increase at all, and in one or two cases there has been an apparent decrease. In other samples, where the bacteria were in millions at the outset, there was a slight increase during the 21 hours. In one case the increase was fourfold. In all others it was less than this, and in most cases it was less than 20 per cent. This fact shows that it is possible to preserve samples from analysis for 20 hours without very great change in bacterial content, providing they be immersed in melting ice and water.

Effect of shaking.—The effect of shaking was evident, but it was not very great. In three cases there was an increase of two or three fold in bacterial count as the result of shaking. In all others it was less than this. The smallest increase brought about by shaking was 30 per cent.

RESULTS OF THE DIRECT MICROSCOPIC EXAMINATION.

The most interesting conclusion in this series of tests was the comparison of the plate counts with the direct microscopic count. The summary table following is prepared, giving these results in such a way as to make them most easily comparable with each other.

TABLE IX.—*Direct microscopic counts compared with the average plate counts.*

No.	Count.	Before icing.			After icing.		
		Average plate count.	Microscopic groups.	Individuals.	Average plate count.	Microscopic groups.	Individuals.
82	By Br.	6,000	1,500	3,000	4,500	5,800	16,000
	By Bd.	6,000		50,000	4,500		900,000
	By Br.	6,000	2,000	6,500	4,500	1,500	8,000
83	By Bd.	6,000		65,000	4,500		425,000
	By Br.	12,600	6,000	67,000	12,500	10,500	56,000
	By Bd.	12,600		131,000	12,500		67,000
84	By Br.	12,600	3,000	23,000	12,500	5,000	44,000
	By Bd.	12,600		116,000	12,500		1,700,000
	By Br.	11,000	7,000	97,000	11,400	8,000	52,000
85	By Bd.	11,000		32,000	11,400		265,000
	By Br.	11,000	2,500	29,000	11,400	4,000	24,500
	By Bd.	11,000		80,000	11,400		210,000
86	By Br.	70,000	24,500	67,000	78,000	15,000	208,000
	By Bd.	70,000		150,000	78,000		131,000
	By Br.	70,000	34,950	333,000	78,000	28,000	267,000
87	By Bd.	70,000		390,000	78,000		1,000,000
	By Br.	217,000	245,000	948,000	230,000	212,000	2,130,000
	By Bd.	217,000		2,500,000	230,000		2,900,000
88	By Br.	217,000	128,000	592,000	230,000	220,000	991,000
	By Bd.	217,000		3,100,000	230,000		2,000,000
	By Br.	920,000	1,900,000	7,968,000	4,300,000	2,230,000	15,000,000
89	By Bd.	920,000		23,000,000	4,300,000		21,000,000
	By Br.	920,000	981,000	3,500,000	4,300,000	3,500,000	16,000,000
	By Bd.	920,000		70,000,000	4,300,000		8,000,000
90	By Br.	920,000	557,000	22,900,000	4,300,000	3,420,000	20,000,000
	By Bd.	920,000		24,000,000	4,300,000		3,000,000
	By Br.	10,000,000	13,617,000	240,000,000	14,000,000	2,563,000	131,000,000
91	By Bd.	10,000,000		150,000,000	14,000,000		460,000,000
	By Br.	10,000,000	6,800,000	95,000,000	14,000,000	2,982,000	145,000,000
	By Bd.	10,000,000		243,000,000	14,000,000		90,000,000

¹ Less than 16,000.² Less than 65,000.³ Less than 90,000.⁴ Less than 210,000.

In the above table Br. refers to the microscopic counts by Breed in Borden's laboratory, and Bd. to the counts made by the Board of Health.

Two samples of each bottle of milk were examined by each laboratory and three samples of No. 78. The microscopic count of each sample is given above, but the plate count average is the average of all the plate counts made from the same bottle, this general average being given as most representative:

From this table several conclusions can be drawn:

1. The direct microscopic count classifies samples of milk into grades A, B, and C as accurately as will the plate count of the same samples. When groups of bacteria are counted instead of individuals, these samples of milk will agree in grade, whether they were graded by the plate method or the direct microscopic method.

2. It is evident from these tests that the microscope alone can give an actual indication of the number of bacteria in the milk. The plate method is obviously inadequate to give anything but groups. Where the milk is filled with a type of bacteria that has a tendency to cling in clumps, the plate method alone can give no adequate knowledge of the number of bacteria present.

3. The rather close agreement of the plate count with the group count obtained by Breed upon the same samples of milk shows that

in these samples there was no noticeable counting of dead bacteria, indicating that in fresh milk which has been subjected to normal conditions practically all of the bacteria are alive, at least for a period of 24 hours from the time of milking.

4. Criticism has been made against the Breed method of microscopic examination on the ground that the use of 1/100 c. c. is inaccurate, since such a small amount can not be regarded as giving a fair sample of the milk. It has been claimed that the plate method, which starts with a whole cubic centimeter, will give more accurate results in this respect, even though this is subsequently diluted with water. A comparison of the microscopic group counts in the above tables with the plate counts of the same samples is a complete answer to this criticism.

5. A second criticism of the microscopic method is that it is applicable only to samples of milk containing large numbers of bacteria and not practical in milk where the bacteria are only a few thousand per c. c. The reason for this criticism is that the microscopic field covers such a small portion of a cubic centimeter of milk that the factor by which the number of bacteria found per field must be multiplied is so large as to make it unusable where the number of bacteria is small. The figures in the above table are also a complete answer to this criticism, for the counts of Breed upon the low counting samples are equally accurate with the higher counting samples and agree quite satisfactorily with the plate counts upon the same samples of milk.

Inasmuch as the laboratory of the Board of Health did not in this case count groups, but only individuals, no comparison can be made between their counts and those of the plates. In general magnitude of the number of individuals per c. c., however, it will be seen that the microscopic count of the board of health agrees fairly well with the individual count of Breed.

FOURTH SERIES OF TESTS.

The extremely interesting results obtained by a comparison of the microscopic tests with the plate counts in the third series of tests led to the planning of a fourth series, in which the microscope should be used more extensively for comparison. In this case Dr. Breed came to New York, and brought with him Dr. Brew, who has been working with him in the Geneva Experiment Station upon the microscopic method. Dr. Breed made smears of the samples of milk received by the Board of Health laboratory and Dr. Brew made smears of milk submitted to the laboratory of Borden. The Board of Health and the Borden laboratories also made smears from the same samples, and the reports were submitted to the referee without comparison with each other. In this last series it was also to be understood that

groups should be counted rather than individuals. Dr. Breed and Dr. Brew both made individual counts also, but the Board of Health and Borden laboratories made only group counts. The Board of Health laboratory, in addition to using a 1/100 c. c. pipette, used also the platinum loop method of obtaining the 1/100 c. c. of milk for smearing.

In this last series a further test was made of two more lots of peptone from the Digestive Ferment Co., as compared with the media made up from Witte's peptone.

In this series each laboratory counted its plates at the end of 24 hours and again at the end of 48 hours, for the purpose of finding whether the 24-hour count is manifestly inferior to the 48-hour count. It was to be expected that the 24-hour count would be somewhat less; but the advantage of saving 24 hours is obvious to anyone who has had anything to do with the technique of milk inspection, and it has been strongly urged that a 24-hour count might be advantageously substituted for a 48-hour count, which is now required by standard methods.

In this series of tests a slight difference in the reporting of the tests was made. In the previous series the figures given as the final report and published in the previous tables were those determined by the referee in studying the different counts of the different dilutions as submitted to him. In this last series, however, each laboratory was requested to make its own final report, and the figures reported are the reports that the laboratories themselves would send out as the results of their analyses of their own plates. There is, however, practically no difference between the results here reported and those that have hitherto been reported by the referee, except that in a few cases in the previous tables the final report was obtained by averaging the reports of two different dilutions, whereas in these cases the reports were, as a rule, obtained from a single report made, which gave the best number of colonies per plate. In the following table the count of the second laboratory is placed immediately under that of the first, to make easy comparison possible. The first four columns are plate counts and the last two microscopic counts. The third column was obtained by the use of dilute media like that in the last series of tests.

TABLE X.

	Stan.	Det.	Dilute.	24 hours.	Microscopic groups.	Microscopic individuals.
No. 85:						
A rep.....	81,000,000	38,000,000	72,000,000	19,800,000	Bo. 15,500,000	.....
B rep.....	27,000,000	38,000,000	31,000,000	.....	Br. 54,520,000	231,000,000
A rep.....	34,000,000	61,000,000	38,000,000	42,000,000	Bo. 5,700,000	.....
B rep.....	25,000,000	22,000,000	35,000,000	.....	Br. 40,000,000	151,000,000
A rep.....	79,000,000	48,000,000	81,000,000	54,000,000	Bo. 9,000,000	.....
B rep.....	20,000,000	29,000,000	28,000,000	.....	Br. 36,000,000	149,000,000
B rep.....	31,000,000	26,000,000	22,000,000	33,320,000	.....	.....

TABLE X—Continued.

	Stan.	Det.	Dilute.	24 hours.	Microscopic groups.	Microscopic individuals.
No. 85—Continued.						
A rep.....	56,000,000	15,000,000	16,000,000			
B rep.....	40,000,000	37,000,000	31,000,000	4,000,000		
A rep.....	34,200,000	61,000,000	38,000,000			
B rep.....	34,000,000	31,000,000	36,000,000	2,900,000		
A rep.....	79,000,000	48,000,000	81,000,000			
C rep.....	27,000,000	37,000,000	38,000,000	34,000,000	Bd. of H. 38,000,000	
D rep.....	36,000,000	36,000,000	40,000,000		Breed 50,000,000	Group.
C rep.....	37,000,000	41,000,000	23,000,000	44,000,000	Bd. of H. 45,500,000	
D rep.....	40,000,000	36,000,000	37,000,000		Breed 45,000,000	Group.
C rep.....	24,000,000	30,000,000	34,000,000	48,000,000	Bd. of H. 42,000,000	
D rep.....	23,000,000	21,000,000	40,000,000		Breed 43,000,000	Group.
D rep.....	2,000,000	9,200,000	31,000,000	1,300,000		
C rep.....	2,040,000	10,000,000	3,210,000			
D rep.....	10,000,000	1,500,000	13,000,000	600,000		
C rep.....	1,970,000	1,830,000	16,200,000			
D rep.....	15,000,000	15,000,000	40,000,000	18,000,000		
C rep.....	13,600,000	14,500,000	13,200,000			
No. 86:						
A rep.....	410,000	231,000	420,000	280,000	Bo. 89,000	
B rep.....	390,000	320,000	400,000		Br. 147,000	4,428,000
A rep.....	279,000	206,000	258,000	270,000	Bo. 76,000	
B rep.....	247,000	210,000	185,000		Br. 157,000	3,933,000
A rep.....	320,000	500,000	315,000	324,000	Bo. 185,000	
B rep.....	550,000	235,000	306,000		Br. 123,000	3,278,000
B rep.....	392,000	264,000	231,000	228,000		
A rep.....	144,000	228,000	155,000			
B rep.....	245,000	243,000	141,000	170,000		
A rep.....	132,000	237,000	63,000			
B rep.....	326,000	240,000	225,000	255,000		
A rep.....	220,000	260,000	142,000			
C rep.....	400,000	310,000	287,000	245,000	Bd. of H. 484,000	
D rep.....	360,000	330,000	340,000		Breed 224,000	Group.
C rep.....	310,000	260,000	268,000	230,000	Bd. of H. 476,500	
D rep.....	350,000	360,000	400,000		Breed 267,000	Group.
C rep.....	232,000	213,000	255,000	250,000	Bd. of H. 558,000	
D rep.....	300,000	250,000	300,000		Breed 220,000	Group.
D rep.....	83,000	110,000	90,000	67,000		
C rep.....	81,000	124,000	89,000			
D rep.....	133,000	153,000	140,000	130,000		
C rep.....	118,000	136,000	143,000			
D rep.....	140,000	163,000	150,000	140,000		
C rep.....	129,000	116,000	119,000			
No. 87:						
A rep.....	553,000	352,000	480,000	432,000	Bo. (-)	
B rep.....	390,000	428,000	600,000		Br. 185,000	1,005,000
A rep.....	505,000	299,000	580,000	538,000	Bo. 360,000	
B rep.....	800,000	443,000	710,000		Br. 190,000	558,000
A rep.....	603,000	600,000	545,000	544,000	Bo. 270,000	
B rep.....	400,000	540,000	780,000		Br. 186,000	795,000
B rep.....	000,000	570,000	710,000	600,000		
A rep.....	540,000	326,000	470,000			
B rep.....	560,000	293,000	288,000	375,000		
A rep.....	703,000	146,000	115,000			
B rep.....	348,000	700,000	516,000	430,000		
A rep.....	316,000	310,000	555,000			
C rep.....	208,000	212,000	78,000	155,000	Bd. of H. 480,000	
D rep.....	230,000	243,000	120,000		Breed 268,000	
C rep.....	311,000	274,000	182,000	275,000	Bd. of H. 625,000	
D rep.....	300,000	280,000	200,000		Breed 275,000	
C rep.....	470,000	583,000	400,000	480,000	Bd. of H. 925,000	
D rep.....	480,000	550,000	390,000		Breed 405,000	
D rep.....	123,000	72,000	87,000	71,000		
C rep.....	152,000	64,000	81,000			
D rep.....	120,000	100,000	78,000	87,000		
C rep.....	120,000	95,000	120,000			
D rep.....	290,000	230,000	210,000	220,000		
C rep.....	219,000	154,000	250,000			
No. 88:						
A rep.....	406,000	520,000	410,000	336,000	Bo. 300,000	
B rep.....	490,000	392,000	390,000		Br. 121,000	904,000
A rep.....	188,000	320,000	170,000	243,000	Bo. 252,000	
B rep.....	186,000	349,000	390,000		Br. 104,000	1,018,000
A rep.....	298,000	253,000	232,000	293,000	Bo. 80,000	
B rep.....	121,000	262,000	240,000		Br. 66,000	959,000
B rep.....	680,000	412,000	230,000	490,000		
A rep.....	600,000	322,000	151,000			
B rep.....	640,000	480,000	460,000	486,000		
A rep.....	580,000	460,000	390,000			
B rep.....	624,000	400,000	145,000	517,000		
A rep.....	500,000	244,000	116,000			

TABLE X—Continued.

	Stan.	Det.	Dilute.	24 hours.	Microscopic groups.	Microscopic individuals.
No. 88—Continued.						
C rep.....	294,000	292,000	124,000	255,000	Bd. of H. 336,000	
D rep.....	289,000	143,000	284,000		Breed 147,000	Group
C rep.....	159,000	250,000	244,000	110,000	Bd. of H. 345,000	
D rep.....	156,000	151,000	250,000		Breed 74,000	Group.
C rep.....	248,000	167,000	156,000	142,000	Bd. of H. 242,000	
D rep.....	239,000	147,000	171,000		Breed 107,000	Group.
D rep.....	230,000	140,000	110,000	110,000		
C rep.....	145,000	208,000	122,000			
D rep.....	200,000	200,000	160,000	100,000		
C rep.....	260,000	216,000	148,000			
D rep.....	190,000	120,000	90,000	82,000		
C rep.....	100,000	95,000	80,000			
No. 89:						
A rep.....	289,000	274,000	304,000	288,000	Bo. 319,000	
B rep.....	310,000	360,000	420,000		Br. 321,000	862,000
A rep.....	514,000	258,000	540,000	264,000	Bo. 175,000	
B rep.....	480,000	720,000	416,000		Br. 345,000	1,075,000
A rep.....	179,000	173,000	260,000	141,000	Bo. 216,000	
B rep.....	308,000	281,000	304,000		Br. 237,000	693,000
B rep.....	88,000	95,000	260,000	43,000		
A rep.....	97,000	95,000	66,000			
B rep.....	101,000	96,000	138,000	90,000		
A rep.....	101,000	121,000	118,000			
B rep.....	400,000	168,000	156,000	260,000		
A rep.....	366,000	310,000	127,000			
C rep.....	506,000	370,000	172,000	286,000	Bd. of H. 975,000	
D rep.....	525,000	182,000	430,000		Breed 593,000	Group.
C rep.....	530,000	440,000	316,000	400,000	Bd. of H. 468,000	
D rep.....	500,000	334,000	470,000		Breed 452,000	Group.
C rep.....	430,000	465,000	236,000	315,000	Bd. of H. 493,000	
D rep.....	513,000	146,000	600,000		Breed 450,000	Group.
D rep.....	360,000	350,000	130,000	320,000		
C rep.....	300,000	183,000	135,000			
D rep.....	340,000	320,000	20,000	100,000		
C rep.....	300,000	340,000	30,000			
D rep.....	320,000	270,000	70,000	13,000		
C rep.....	285,000	274,000	43,000			
No. 90:						
A rep.....	145,000	130,000	166,000	128,000	Bo. (—)	
B rep.....	152,000	132,000	137,000		Br. 30,000	294,000
A rep.....	206,000	182,000	138,000	88,000	Bo. 115,000	
B rep.....	159,000	146,000	168,000		Br. 23,000	241,000
B rep.....	184,000	165,000	126,000	106,000		
A rep.....	76,000	166,000	88,000			
B rep.....	160,000	166,000	131,000	140,000		
A rep.....	144,000	90,000	106,000			
C rep.....	120,000	210,000	143,000	232,000	Bd. of H. 98,000	
D rep.....	140,000	300,000	200,000		Breed 63,000	Group.
C rep.....	208,000	85,000	142,000	105,000	Bd. of H. 140,000	
D rep.....	200,000	200,000	170,000		Breed 67,000	Group.
D rep.....	63,000	44,000	42,000	47,000		
C rep.....	53,000	44,000	46,000			
D rep.....	70,000	48,000	52,000	56,000		
C rep.....	61,000	61,000	60,000			
No. 91:						
A rep.....	2,180,000	560,000	1,260,000	234,000	Bo. 310,000	
B rep.....	1,730,000	530,000	1,460,000		Br. 368,000	2,150,000
A rep.....	1,310,000	1,110,000	1,810,000	680,000	Bo. 676,000	
B rep.....	1,240,000	1,250,000	1,270,000		Br. 535,000	3,347,000
A rep.....	1,650,000	1,360,000	1,060,000	430,000		
B rep.....	1,600,000	1,250,000	980,000			
B rep.....	1,740,000	1,400,000	1,650,000	460,000		
A rep.....	1,380,000	990,000	1,110,000			
B rep.....	2,240,000	1,340,000	2,500,000	460,000		
A rep.....	2,010,000	780,000	2,100,000			
B rep.....	1,640,000	1,500,000	1,330,000	322,000		
A rep.....	1,460,000	960,000	1,010,000			
C rep.....	1,190,000	1,390,000	1,370,000	1,800,000	Bd. of H. 907,000	
D rep.....	1,200,000	1,700,000	1,200,000		Breed 485,000	
C rep.....	890,000	1,280,000	1,410,000	1,250,000	Bd. of H. 1,224,000	
D rep.....	900,000	1,300,000	1,300,000		Breed 558,000	
C rep.....	1,650,000	2,200,000	1,190,000	1,400,000	Bd. of H. 8,832,000	
D rep.....	1,600,000	2,700,000	1,150,000		Breed 895,000	
D rep.....	460,000	500,000	430,000	410,000		
C rep.....	535,000	573,000	420,000			
D rep.....	370,000	350,000	350,000	220,000		
C rep.....	500,000	560,000	400,000			
D rep.....	356,000	260,000	350,000	250,000		
C rep.....	430,000	216,000	158,000			

TABLE XI.—*Microscopic count, showing comparison of the group and the individual count, and also the loop as compared with the pipette method.*

No.	Gr. Groups.		Individuals.	Pipette method.	Loop method.
85	By Brew.....	54,500,000	231,000,000		
		40,000,000	181,000,000		
		36,000,000	149,000,000		
	Breed.....	50,000,000	355,000,000	Bd. of H. 37,000,000	39,000,000
		45,000,000	237,000,000	42,800,000	49,000,000
86	By Brew.....	43,000,000	203,000,000	46,000,000	43,000,000
		147,000	4,428,000		
		157,000	3,433,000		
		123,000	3,778,000		
	Breed.....	224,000	3,988,000	Bd. of H. 470,000	492,000
87	By Brew.....	267,000	4,480,000	493,000	460,000
		220,000	4,128,000	624,000	493,000
		185,000	1,095,000		
		190,000	558,000		
	Breed.....	185,000	795,000	Bd. of H. 575,000	594,000
88	By Brew.....	268,000	1,184,000	838,000	509,000
		275,000	1,971,000	999,000	854,000
		405,000	1,995,000		
		121,000	904,000		
	Breed.....	104,000	1,018,000	Bd. of H. 345,000	328,000
89	By Brew.....	66,000	939,000	345,000	345,000
		147,000	1,880,000	172,000	312,000
		74,000	950,000		
		107,000	2,725,000		
	Breed.....	321,000	862,000	Bd. of H. 1,035,000	920,000
90	By Brew.....	345,000	1,075,000	460,000	476,000
		237,000	693,000	625,000	363,000
		593,000	1,630,000		
		452,000	1,295,000		
	Breed.....	450,000	1,400,000	Bd. of H. 82,000	115,000
91	By Brew.....	30,000	294,000	148,000	131,000
		23,000	241,000		
		63,000	789,000		
		67,000	542,000		
	Breed.....	368,000	2,150,000	Bd. of H. 1,018,000	796,000
	By Brew.....	533,000	3,340,000	1,446,000	1,000,000
		485,000	2,922,000	8,520,000	9,130,000
		558,000	3,435,000		
		852,000	4,460,000		
	Breed.....				

General Summary of Fourth Series.

Uniformity of results.—The variations in the analyses of duplicate samples is about the same as in the second and third series. Somewhat widely discrepant individual variations are evident still, showing that in spite of extreme care occasional errors will be made even in the best laboratories. Among these variations it will be noticed that the laboratory D again gave the lowest numbers in practically every case. The actual relation of the laboratories to the general average and to each other is shown by the following table:

TABLE XII.

No.	General average.	A average.	B average.	C average.	D average.
85	32,000,000	41,000,000	41,000,000	32,000,000	14,000,000
86	348,000	320,000	244,000	306,000	122,000
87	377,000	496,000	450,000	344,000	147,000
88	293,000	321,000	495,000	210,000	149,000
89	304,000	347,000	176,000	460,000	149,000
90	134,000	156,000	145,000	183,000	54,000
91	1,155,000	1,250,000	1,450,000	1,500,000	426,000

Comparison of the 24 and the 48 hour count.—The 24-hour count is smaller than the 48-hour count in a majority of cases. In 52 reports the 48-hour count is the larger and in 28 cases the 24-hour count is the larger. The extent of the difference is shown by the following averages:

In the averages of the 28 series of samples (seven different bottles of milk to each laboratory) the 48-hour count was the larger in 25 cases, smaller in 1 case, and the same in 2 cases. The averages of the whole series (omitting the samples counting in millions) was 299,000 for the 48-hour count and 147,000 for the 24-hour count. In other words, on the average the 48-hour count gave about twice as large numbers as the 24-hour count. In 4 cases where the count was over 10,000,000, three times the 24 and the 48 hour count practically agreed, while in the fourth case the 24-hour count was much the lowest.

In this series of figures the test of the Detroit peptone (two other lots being furnished the laboratories) shows a slight superiority for the Witte peptone. In 45 reports the Witte gave the higher counts and in 32 the Detroit gave the higher. Given in a little more detail, the averages were as follows:

TABLE XIII.

No.	Laboratory A.		Laboratory B.	
	Standard.	Detroit.	Standard.	Detroit.
85	44,300,000	29,300,000	45,000,000	36,000,000
86	349,000	294,000	388,000	245,000
87	549,000	451,000	510,000	390,000
88	295,000	348,000	300,000	386,000
89	346,000	346,000	193,000	147,000
90	165,000	148,000	141,000	149,000
91	1,634,000	1,340,000	1,740,000	1,490,000
	Laboratory C.		Laboratory D.	
	Standard.	Detroit.	Standard.	Detroit.
85	31,000,000	33,000,000	(?)	(?)
86	325,000	287,000	147,000	199,000
87	333,000	353,000	170,000	124,000
88	229,000	192,000	187,000	163,000
89	484,000	323,000	317,000	289,000
90	167,000	132,000	61,000	50,000
91	1,240,000	1,760,000	44,300	40,700

Although the above figures favor the Witte peptone, the difference is very slight, and, when taken in connection with the reports on the third series of tests, is hardly sufficient to warrant regarding the one as in reality superior to the other.

The results with the dilute media were too irregular to warrant the drawing of any conclusions.

Microscopic analyses.—A condensed summary of the microscopic results is given in the following table. In the first column is given the average plate count of the samples submitted to Borden's laboratory, and in the next two columns the microscopic group count, both by Borden and by Brew, the representative of Breed, each based upon separate smears. In the third column is given the average plate count of the samples submitted to the Board of Health, and the next two columns give the microscopic count made by Breed and by the Board of Health on the same samples.

TABLE XIV.—*Microscopic count compared with average plate count.*

No.	Plate.	Borden.	Brew.	Plate.	Breed.	Board of health.
85.....	41,000,000	10,000,000	43,000,000	32,000,000	46,000,000	42,000,000
86.....	320,000	116,000	107,000	300,000	250,000	500,000
87.....	496,000	315,000	187,000	344,000	316,000	521,000
88.....	321,000	210,000	93,000	210,000	109,000	312,000
89.....	347,000	294,000	237,000	400,000	374,000	646,000
90.....	156,000	115,000	26,500	183,000	65,000	119,000
91.....	1,250,000	490,000	450,000	1,500,000	623,000	3,600,000

From the above table it will be seen that in general magnitude the microscopic count agrees fairly well with the plate count. The exceptions to this are no more variant from the general averages of the different laboratories than the plate-count averages of the different laboratories are from each other, as shown by the previous tables.

As in the last series, it is evident that the plate count can give no real indication of the actual number of bacteria, since the individual count is uniformly higher than the group or the plate count.

In the hands of the Board of Health laboratory the use of the wire loop for this microscopic test appears to yield results as reliable as, and practically identical with, the use of the $\frac{1}{100}$ c. c. pipette.

GENERAL SUMMARY AND CONCLUSIONS.

1. The standard methods of Milk Analysis, published by the American Public Health Association, are in emphatic need of revision. These standard methods lay great emphasis on some of the least important points, while they neglect to lay any emphasis on some of the most important ones. The revision of these methods is now in the hands of at least three committees, one appointed by the American Public Health Association, one by the Society of American Bacteriologists, and one by the Association of Dairy Instructors.

2. Individual analyses under the best conditions are subject to considerable variation, so that no single individual count can be properly relied upon. This emphasizes the necessity of demanding an average of two or more plates in determining the bacterial content of any sample of milk.

3. The question of the exact composition of the media to be used is of far less significance than that of the methods used in the manipulation. Wide variations in the composition of the media do not make any noticeable difference in the bacterial count.¹

4. Greater care is needed to unify laboratory methods than has hitherto been given. When the work of these four laboratories was compared at the outset it was found that there were very wide differences in the analyses of duplicate samples, due chiefly to differences in laboratory technique.

5. These variations in the analyses of duplicate samples of the same lot of milk have been found to be due to several causes:

a. Laboratory errors. These occasionally appear, due doubtless to confusion which is sure to arise when large numbers of samples of milk are analyzed at the same time.

b. Irregularities in methods of laboratory technique. These are several in number, the more important seeming to be the following:

I. Shaking of the samples. Wide variations were found in the vigor and the extent of the shaking to which the samples of milk and the dilutions are subjected by the different laboratories. While this factor does not make a very great difference in results, it is one of the irregularities that should be eliminated.

II. Amount of dilution. The counts from highly seeded plates are uniformly lower than the counts of the same milk from low-seeded plates. The best results are obtained only when the plates contain somewhere between 40 and 200 colonies. Hence the number of dilutions made in any analysis will materially affect the results.

III. Methods of counting. This has seemed to be the cause of the widest amount of irregularity. The greatest difference was associated with the use or nonuse of a counting lens, or to differences in magnifying power of the lens used.²

Even when this difference is eliminated the further results show that the personal equation in counting is still a factor of very large importance. When the same plate is counted by two different laboratories the results are not infrequently 100 per cent apart, and occasionally even more.

A third factor modifying the counting is the method adopted by each laboratory of estimating numbers rather than actual counting. In plates that contain large numbers of colonies it is of course necessary to make an estimate rather than to count them all. The laboratories adopt different methods in such conditions, the results being slightly different.

¹ For this reason and in order to produce uniformity, there has already been adopted by the American Public Health Association a change in the standard methods by which beef extract can be substituted for beef infusion and the acidity of the standard agar fixed at 1 per cent, thus making it uniform with that of the standard used in water analyses.

² The recognition of this fact has already led to a modifying of the standard methods, which now require a lens of 3j diameters to be used in counting all plates.

IV. Irregularities in samples from the same bottle of milk. Two samples taken from the same bottle of milk, even after thorough shaking, are by no means identical. This is easily explained, and is due (1) to the clumping of bacteria and (2) to the fact that inasmuch as bacteria are not in solution but are solid objects they can not be expected to be uniformly distributed through the liquid. The tests show that one sample of a bottle of milk when tested by the plate method may sometimes not contain more than one-fourth as many bacteria as other samples from the same bottle.

V. In low counts variation between duplicate samples is sometimes considerable, due to the irregularity of the distribution of bacteria.

In high counts variation in reports is also sometimes very great, due to excessive crowding and to methods adopted in estimating the number of colonies.

6. The extent of the variation in the results obtained from the analysis of duplicate samples varies widely with the care that is taken in the laboratory technique. It has been found in these tests that at first the above causes of irregularity were sufficient to give results disagreeing as much as tenfold in the number of bacteria that would be reported from any sample of milk. The vast majority of results, however, were much closer than this, even at the beginning of this series of tests.

7. After attention had been called to the points of irregularity and the laboratories had adopted methods of bringing about uniformity in technique so far as possible, the variations were very greatly reduced, the last tests showing that when sufficient care is given the variations need not be more than twofold. It is not possible to rely upon a greater accuracy than 100 per cent even when an average of more than one analysis is obtained, although most of the results fall considerably below this limit.

8. There is no essential difference in the results whether milk dilution is directly inoculated into the petri dish and the agar poured upon it, or whether the milk dilution is inoculated into the melted tube of agar and subsequently poured into the petri dish. The difference between the two methods is so slight as to make it impossible to determine which is the superior of the two. But when examinations of cream are made the plate inoculation is unreliable, and the inoculation must be made in the agar tube followed by thorough agitation.

9. Five days' incubation (48 hours at 37° and 72 hours at 20°) gives a very slightly greater count than a two-day incubation. The increase in count is so slight that for general regulation purposes it is hardly superior to a two-day count; and considering the superior value of obtaining the count promptly there seems to be no reason for changing from a two-day count to a five-day count.

10. A 24-hour count gives on the average about one-half as high numbers as a 48-hour count.

11. In spite of all these irregularities the results with duplicate samples in the four laboratories have been found, within certain somewhat wide limits, fairly accurate. They are at all events accurate enough to warrant three broad grades, essentially three grades that have been adopted by the commission on milk standards. But they are not as yet accurate enough to warrant a closer grading than the commission's grades A, B, and C, A including all below 200,000 (or 100,000), B from 200,000 to 1,000,000, and C including all above 1,000,000. For this broad grading it is necessary to have an average of at least four or five separate analyses in order to rely upon the results. Even then there will be an occasional overlapping of grade B with either grade C on the one hand or grade A on the other.

12. This series of tests has proved that if a sample of milk can be put into iced water, containing floating ice, it may be kept for 20 hours with very little change in bacteria count. This makes it possible to keep samples sent to a laboratory for analysis for a number of hours without any fear of change in bacterial content, provided the samples are immersed in water containing floating ice.

13. These tests have seemed to indicate that the American peptone, made by the Digestive Ferment Co., of Detroit, can be substituted for Witte peptone without materially changing the results.

14. *Direct microscopic method of bacterial examination of milk by the Breed method.*—In making a comparison of the bacteriological analysis by the plate count and the microscopic count, the latter should be a count of groups rather than individuals, plate colonies representing groups only.

15. Considerable experience by the person making the count is needed to distinguish between bacteria and dirt particles, particularly when the milk contains minute micrococci.

16. When the microscopic count is made by one who has had sufficient experience, the group count agrees somewhat closely with the plate count—agreeing, indeed, about as closely as the plate counts of different laboratories agree with each other.

17. Raw, fresh milk does not contain any appreciable number of dead bacteria which might disclose themselves to the microscope, but fail to grow in plates.

18. The direct microscopical examination of milk smears by the Breed method will classify raw milk into grades A, B, and C with about the same accuracy and much more quickly than the plate method of bacteriological analysis will do. It is of no use in the study of pasteurized milk, however, since it discloses dead as well as living bacteria, no method of distinguishing between them having

yet been perfected. It might be of value in telling whether such milk had become old before it was pasteurized, since such would show large numbers of dead bacteria by the microscopic method, though it might show small numbers by the plate method.

19. The direct microscopical method of bacteriological analysis might be of exceptional value applied at the dairy to guide the dairyman as to the general grade of the milk he is marketing. It may also be of great aid to the large dealer to enable him to determine promptly whether he is purchasing milk of A, B, or C grade. The possibility of quick results and ease of making the smears at the dairy or shipping station, subsequently sending them to the laboratory for microscopic examination, renders the method especially applicable at the dairy end of the line.

PLAGUE-PREVENTION WORK.

CALIFORNIA.

The following report of plague-prevention work in California for the week ended July 24, 1915, was received from Passed Asst. Surg. Hurley, of the United States Public Health Service, in temporary charge of the work:

SAN FRANCISCO, CAL.

RAT PROOFING.

New buildings:	
Inspections of work under construction..	213
Basements concreted (square feet, 18,056)	25
Floors concreted (square feet, 4,190)....	7
Yards, passageways, etc. (square feet, 8,470).....	53
Total area of concrete laid, square feet..	30,716
Class A, B, and C (fireproof) buildings:	
Inspections made.....	203
Roof and basement ventilators, etc., screened.....	5,205
Wire screening used, square feet.....	25,410
Openings around pipes, etc., closed with cement.....	8,593
Sidewalk lens lights replaced.....	1,540
Old buildings:	
Inspections made.....	241
Wooden floors removed.....	15
Yards and passageways, planking removed.....	4
Cubic feet new foundation walls installed.....	3,055

SAN FRANCISCO, CAL.—Continued.

RAT PROOFING—continued.

Old buildings—Continued.	
Concrete floors installed (square feet, 42,775).....	35
Basements concreted (square feet, 7,370).....	15
Yards and passageways, etc., concreted (square feet, 13,638).....	38
Total area concrete laid, square feet....	63,783
Floors rat proofed with wire cloth (square feet, 2,516).....	6
Buildings razed.....	9
New garbage cans stamped approved.....	722
Nuisances abated.....	213

OPERATIONS ON THE WATER FRONT.

Vessels inspected for rat guards (times)....	22
Reinspections made on vessels.....	28
New rat guards procured.....	8
Defective rat guards repaired.....	10
Vessels on which cargo was inspected.....	1

Amount of cargo and description of same.	Condi- tion.	Rat evi- dence.
Steamer President from Seattle:		
162 cases salmon, candy, ham, and household goods.....	O. K....	None.
300 sacks flour and rice.....	O. K....	None.

Rats trapped on wharves and water front.....	31
Rats trapped on vessels.....	30
Traps sets on wharves and water front.....	161
Traps set on vessels.....	60
Vessels trapped on.....	9
Poisons placed on water front..... pieces..	3,600
Poisons placed within Panama-Pacific International Exposition grounds..... pieces..	7,200
Bait used on water front and vessels—bacon..... pounds..	6
Amount of bread used in poisoning water front..... loaves..	12
Pounds of poison used on water front.....	6

RATS COLLECTED AND EXAMINED FOR PLAGUE.

San Francisco:	
Collected.....	352
Examined.....	267
Found infected.....	None.
Contra Costa County:	
Trapped.....	3
Examined.....	3
Found infected.....	None.

SQUIRRELS COLLECTED AND EXAMINED FOR PLAGUE.

Contra Costa County.....	888
Alameda County.....	331

SQUIRRELS COLLECTED AND EXAMINED FOR PLAGUE—Continued.

San Benito County.....	266
Monterey County.....	116
Stanislaus County.....	14
Total.....	1,615
Examined.....	1,615
Found infected.....	1

RANCHES INSPECTED AND HUNTED OVER.

Contra Costa County.....	106
Alameda County.....	59
Stanislaus County.....	3
San Benito County.....	31
Monterey County.....	20
Total.....	219

POSITIVE CASE—HUMAN PLAGUE.

Contra Costa County: N. G.; male; age, 21 years; nativity, Greece. Sickened July 13, 1915, at Concord, Contra Costa County, Cal.; died July 21, 1915. Verified bacteriologically July 23, 1915.

PLAGUE-INFECTED SQUIRREL.

San Benito County: Shot July 10, 1915, D. J. Watson ranch (Rancho San Justo), 7 miles southwest of Hollister, 1 squirrel.

Record of plague infection.

Places in California.	Date of last case of human plague.	Date of last case of rat plague.	Date of last case of squirrel plague.	Total number rodents found infected since May, 1907.
Cities:				
San Francisco.....	Jan. 30, 1908	Oct. 23, 1908	None.....	398 rats.
Oakland.....	Aug. 9, 1911	Dec. 1, 1908	.....do.....	126 rats.
Berkeley.....	Aug. 23, 1907	None.....	.....do.....	None.
Los Angeles.....	Aug. 11, 1908	.....do.....	Aug. 21, 1908	1 squirrel.
Counties:				
Alameda (exclusive of Oakland and Berkeley).....	Sept. 24, 1909	Oct. 17, 1909	Aug. 7, 1914	286 squirrels; 1 wood rat.
Contra Costa.....	July 13, 1915	None.....	July 1, 1915	1,572 squirrels.
Fresno.....	None.....	.....do.....	Oct. 27, 1911	1 squirrel.
Merced.....	.....do.....	.....do.....	July 12, 1911	5 squirrels.
Monterey.....	.....do.....	.....do.....	Apr. 10, 1914	6 squirrels.
San Benito.....	June 4, 1913	.....do.....	July 10, 1915	43 squirrels.
San Joaquin.....	Sept. 18, 1911	.....do.....	Aug. 25, 1911	18 squirrels.
San Luis Obispo.....	None.....	.....do.....	Jan. 29, 1910	1 squirrel.
Santa Clara.....	Aug. 31, 1910	.....do.....	July 23, 1913	25 squirrels.
Santa Cruz.....	None.....	.....do.....	May 17, 1910	3 squirrels.
Stanislaus.....	.....do.....	.....do.....	June 2, 1911	13 squirrels.

The work is being carried on in the following-named counties: Alameda, Contra Costa, San Francisco, Stanislaus, San Benito, and Monterey.

LOUISIANA—NEW ORLEANS—PLAGUE ERADICATION.

The following report of plague-eradication work at New Orleans for the week ended July 31, 1915, was received from Passed Asst. Surg. Simpson, of the United States Public Health Service, in temporary charge of the work:

OUTGOING QUARANTINE.

Vessels fumigated with sulphur.....	14
Vessels fumigated with carbon monoxide....	14
Vessels fumigated with hydrocyanic gas.....	2
Pounds of sulphur used.....	3,040
Pounds of coke consumed in carbon monoxide fumigation.....	19,600
Pounds of potassium cyanide used in hydrocyanic gas fumigation.....	152
Pounds of sodium carbonate used in hydrocyanic gas fumigation.....	200
Pounds of sulphuric acid used in hydrocyanic gas fumigation.....	154
Clean bills of health issued.....	33
Foul bills of health issued.....	3

FIELD OPERATIONS.

Rats trapped.....	5,661
Number of premises inspected.....	11,131
Notices served.....	3,489
Garbage cans installed.....	301

BUILDINGS RAT PROOFED.

By elevation.....	152
By marginal concrete wall.....	155
By concrete floor and wall.....	108
By minor repairs.....	235
Square yards of concrete laid.....	13,028
Total buildings rat proofed.....	650
Lots and sheds, planking removed.....	86
Buildings demolished.....	48
Total buildings rat proofed to date (abated). 92,348	

LABORATORY OPERATIONS.

Rodents received by species:

Mus rattus.....	100
Mus norvegicus.....	1,488
Mus alexandrinus.....	77
Mus musculus.....	3,977
Wood rats.....	41
Musk rats.....	51
Putrid (included in enumeration of species).....	54

Total rodents received at laboratory..... 5,734

Rodents examined..... 1,947

Suspicious rats..... 3

Plague rats confirmed..... None.

Last case of human plague, October 4, 1914.

Last case of rodent plague, July 20, 1915.

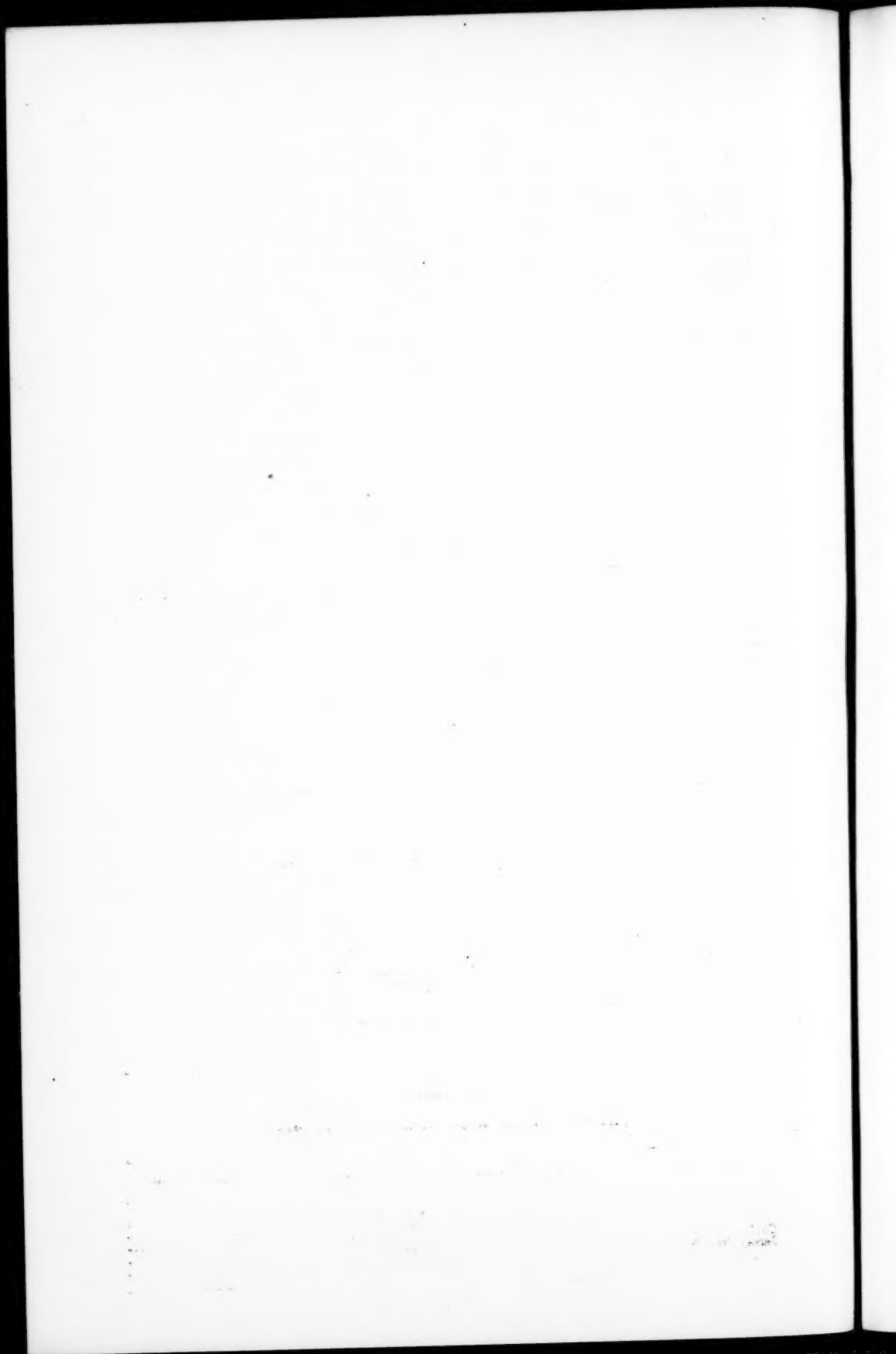
Total rodents captured to July 31..... 402,420

Total rodents examined to July 31..... 273,171

Total cases of rodent plague to July 31, by species:

Mus musculus.....	4
Mus rattus.....	16
Mus norvegicus.....	218
Mus alexandrinus.....	8

Total rodent cases to July 31, 1915..... 246



PREVALENCE OF DISEASE.

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring.

IN CERTAIN STATES AND CITIES.

CEREBROSPINAL MENINGITIS.

City Reports for Week Ended July 24, 1915.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Boston, Mass.....	2	2	New York, N. Y.....	7	6
Buffalo, N. Y.....	1	.....	Pasadena, Cal.....	.....	1
Chicago, Ill.....	.....	1	Philadelphia, Pa.....	2	2
Dayton, Ohio.....	1	.....	Providence, R. I.....	1	.....
Everett, Mass.....	1	.....	Rutland, Vt.....	1	.....
Kansas City, Kans.....	1	1	St. Louis, Mo.....	2	.....
Newport, Ky.....	1	1	Wheeling, W. Va.....	.....	1

DIPHTHERIA.

See Diphtheria, measles, scarlet fever, and tuberculosis, page 2403.

ERYSIPELAS.

City Reports for Week Ended July 24, 1915.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Akron, Ohio.....	1	.....	Lawrence, Mass.....	.....	1
Boston, Mass.....	.....	1	Los Angeles, Cal.....	1	.....
Buffalo, N. Y.....	2	1	Philadelphia, Pa.....	12	1
Chicago, Ill.....	12	1	Pittsburgh, Pa.....	4	.....
Cleveland, Ohio.....	2	.....	Reading, Pa.....	3	.....
Detroit, Mich.....	3	1	San Francisco, Cal.....	2	.....
Hartford, Conn.....	1	.....	Seattle, Wash.....	1	1
Harrisburg, Pa.....	2	.....	Springfield, Ill.....	1	.....
Lancaster, Pa.....	1	.....		

MALARIA.

City Reports for Week Ended July 24, 1915.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Berkeley, Cal.....	1	.....	Newark, N. J.....	3	.....
Boston, Mass.....	1	.....	Philadelphia, Pa.....	.....	1
Chelsea, Mass.....	1	.....	Pittsburgh, Pa.....	1	.....
Jersey City, N. J.....	1	.....	Plainfield, N. J.....	1	.....
Little Rock, Ark.....	2	.....	Richmond, Va.....	3	.....

MEASLES.

See Diphtheria, measles, scarlet fever, and tuberculosis, page 2403.

PELLAGRA.**Kansas—Allen County.**

Collaborating Epidemiologist Crumbine reported that during the week ended July 31, 1915, one case of pellagra was notified in Allen County, Kans.

Texas—Laredo.

Acting Asst. Surg. Hamilton reported that during the period from January 1, 1914, to June 30, 1915, deaths from pellagra were reported in Laredo, Tex., as follows: February 25, 1914, 1; May 6, 1914, 1; July 20, 1914, 1; May —, 1915, 1. Notification had been made of two cases of pellagra existing in Laredo July 31, 1915.

City Reports for Week Ended July 24, 1915.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Charleston, S. C.....		3	Nashville, Tenn.....	3	1
Galveston, Tex.....		1	New Orleans, La.....	3	
Los Angeles, Cal.....	1		Richmond, Va.....	2	
Lowell, Mass.....	1		Wilmington, N. C.....	5	
Lynchburg, Va.....		1			

PLAGUE.**Louisiana—New Orleans—Plague-Infected Rat Found.**

Passed Asst. Surg. Simpson reported by telegraph August 8, 1915, that a plague-infected rat had been found on South Roman Street between Gravier and Perdido Streets, New Orleans, La.

POLIOMYELITIS (INFANTILE PARALYSIS).**Maryland—Baltimore.**

Dr. C. Hampson Jones reports the notification of 21 cases of poliomyelitis (infantile paralysis) at Baltimore, Md., since June 1, 1915. Seven of these cases were notified between August 1 and 7.

City Reports for Week Ended July 24, 1915.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Akron, Ohio.....	3		Erie, Pa.....	4	1
Baltimore, Md.....	2		New York, N. Y.....	1	
Cleveland, Ohio.....	1		Pittsburgh, Pa.....	2	

RABIES.**Montana—Butte.**

The health officer of Butte, Mont., reported that during the week ended July 24, 1915, one case of rabies was notified in that city.

SCARLET FEVER.

See Diphtheria, measles, scarlet fever, and tuberculosis, page 2403.

SMALLPOX.**Kansas.**

Collaborating Epidemiologist Crumbine reported that during the week ended July 31, 1915, cases of smallpox were notified in counties of Kansas as follows: Atchison, 1; Cherokee, 1; Crawford, 1; Greenwood, 1; Harper, 1; Kingman, 1; Labette, 1; Lane, 1; Linn, 1; Morris, 1; Sedgwick, 3; Shawnee, 2; Wyandotte, 2.

Minnesota.

Collaborating Epidemiologist Bracken reported by telegraph that during the week ended August 7, 1915, new foci of smallpox infection were reported in Minnesota, cases of the disease having been notified as follows: Crow Wing County, Crosby, 1; Kandiyohi County, Burbank Township, 1.

Texas—Laredo—Virulent Smallpox.

Acting Asst. Surg. Hamilton reported that during the period from January 1 to August 3, 1915, smallpox cases and deaths were reported as follows: In January, 5 cases; February, 101 cases, 11 deaths; March, 63 cases, 14 deaths; April, 38 cases, 7 deaths; making a total of 207 cases, with 32 deaths. No cases or deaths were reported during May and June. One fatal case occurred in July and one case was reported August 3.

City Reports for Week Ended July 24, 1915.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Butte, Mont.....	3	.....	Lexington, Ky.....	1	.....
Canton, Ohio.....	2	.....	Milwaukee, Wis.....	2	.....
Charleston, S. C.....	1	.....	Portland, Oreg.....	5	.....
Cincinnati, Ohio.....	1	.....	Rock Island, Ill.....	6	.....
Danville, Ill.....	1	.....	Salt Lake City, Utah.....	5	.....
Davenport, Iowa.....	19	.....	Springfield, Ill.....	1	.....
Galveston, Tex.....	2	.....	Tacoma, Wash.....	1	.....
Kansas City, Kans.....	1	.....	Toledo, Ohio.....	1	.....

TETANUS.**City Reports for Week Ended July 24, 1915.**

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Chicago, Ill.....	1	.....	Philadelphia, Pa.....	2	2
Erie, Pa.....	2	.....	Trenton, N. J.....	.....	2
Lowell, Mass.....	1	.....	Wilmington, N. C.....	.....	1
New York, N. Y.....	.....	1			

TUBERCULOSIS.

See Diphtheria, measles, scarlet fever, and tuberculosis, page 2403.

TYPHOID FEVER.**Michigan—Monroe.**

The State Board of Health of Michigan reported by telegraph August 11, 1915, that 20 cases of typhoid fever had been notified in Monroe, Mich., since July 5, 1915.

City Reports for Week Ended July 24, 1915.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Akron, Ohio.....	2		Nashville, Tenn.....	13	2
Alameda, Cal.....	1		Newark, N. J.....	4	
Atlantic City, N. J.....	4		New Bedford, Mass.....	4	
Auburn, N. Y.....	2	1	Newburyport, Mass.....	3	
Baltimore, Md.....	37	2	New Haven, Conn.....	1	
Berkeley, Cal.....	1		New Orleans, La.....	3	2
Boston, Mass.....	6	1	Newport, Ky.....	1	1
Braddock, Pa.....	1		New York, N. Y.....	40	6
Bridgeport, Conn.....	1	1	Norfolk, Va.....	10	
Buffalo, N. Y.....	2	1	Oakland, Cal.....	2	
Charleston, S. C.....	6	1	Pawtucket, R. I.....	1	
Chicago, Ill.....	15	3	Philadelphia, Pa.....	15	2
Cincinnati, Ohio.....	3	1	Pittsburgh, Pa.....	2	
Cleveland, Ohio.....	3	2	Pittsfield, Mass.....	1	
Concord, N. H.....	1		Portland, Oreg.....	1	
Cumberland, Md.....	3		Portsmouth, Va.....	2	
Danville, Ill.....	2		Providence, R. I.....		1
Dayton, Ohio.....	1		Reading, Pa.....	2	
Detroit, Mich.....	7	2	Richmond, Va.....	2	1
Duluth, Minn.....	2		Rochester, N. Y.....	8	
Erie, Pa.....	1		Sacramento, Cal.....	2	
Galveston, Tex.....	1		St. Louis, Mo.....	6	1
Grand Rapids, Mich.....	1		Salt Lake City, Utah.....	2	
Harrisburg, Pa.....	6		San Francisco, Cal.....	5	1
Jersey City, N. J.....	2	2	Seattle, Wash.....	2	
Kenosha, Wis.....	1		South Bethlehem, Pa.....	1	
Key West, Fla.....		1	Springfield, Ill.....	1	1
Lexington, Ky.....	1		Toledo, Ohio.....	14	2
Little Rock, Ark.....	3		Trenton, N. J.....	1	
Lowell, Mass.....	6		Washington, D. C.....	5	
Lynchburg, Va.....	4	1	Wilkes-Barre, Pa.....	1	
Lynn, Mass.....	1		Wilkesburg, Pa.....	1	
Malden, Mass.....	2		Williamsport, Pa.....	1	
Medford, Mass.....	1		Wilmington, N. C.....	2	2
Milwaukee, Wis.....	1		Worcester, Mass.....	1	
Mobile, Ala.....	3		York, Pa.....	4	
Montclair, N. J.....	1		Zanesville, Ohio.....	1	
Morristown, N. J.....	2				

TYPHUS FEVER.**California—Alameda—Correction.**

The report of a case of typhus fever at Alameda, Cal., published in the Public Health Reports July 16, 1915, page 2128, was an error. The case should have been reported as whooping cough.

Tennessee—Memphis.

Senior Surg. White reported August 6, 1915, the presence of a case of typhus fever in Memphis, Tenn. The source of infection was not determined, but the patient, a 6-year-old girl, had recently visited in another city.

Utah—Ogden.

The health officer of Ogden, Utah, reported that during the week ended July 24, 1915, 2 cases of typhus fever were notified in that city.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS.

City Reports for Week Ended July 24, 1915.

City.	Population as of July 1, 1915. (Esti- mated by United States Census Bureau.)	Total deaths from all causes.	Diph- theria.		Measles.		Scarlet fever.		Tubercu- losis.		
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
Over 500,000 inhabitants:											
Baltimore, Md.	581,605	195	15	.....	23	1	8	.....	60	23
Boston, Mass.	745,139	198	38	2	78	.....	32	1	42	26
Chicago, Ill.	2,447,045	504	70	11	197	7	43	1	205	64	
Cleveland, Ohio.	656,975	141	33	2	77	2	9	.....	31	16
Detroit, Mich.	554,717	174	22	.....	12	1	2	.....	41	9
New York, N. Y.	5,468,190	1,299	218	16	455	11	67	2	488	157	
Philadelphia, Pa.	1,683,664	422	20	2	173	7	11	.....	128	51
Pittsburgh, Pa.	571,984	148	17	2	74	.....	18	.....	22	11
St. Louis, Mo.	745,988	189	23	3	48	.....	2	.....	42	17
From 300,000 to 500,000 inhab- itants:											
Buffalo, N. Y.	461,335	134	6	.....	102	1	4	.....	24	14
Cincinnati, Ohio.	406,706	88	13	1	40	1	2	.....	15	10
Jersey City, N. J.	300,153	91	19	1	19	3	9	1	30	7	
Los Angeles, Cal.	465,367	86	7	.....	17	1	6	.....	41	9
Milwaukee, Wis.	428,062	61	7	.....	1	.....	3	.....	22	3
Newark, N. J.	399,000	98	17	1	16	.....	2	.....	34	17
New Orleans, La.	366,484	.....	27	2	.....	.....	1	.....	20	15
San Francisco, Cal.	1,416,912	120	27	3	2	.....	5	.....	32	12
Seattle, Wash.	330,834	44	.....	.....	5	.....	.....	.....	10	3
Washington, D. C.	358,679	98	2	.....	31	.....	4	.....	19	14
From 200,000 to 300,000 inhab- itants:											
Portland, Oreg.	272,833	48	4	.....	4	.....	.....	.....	5	4
Providence, R. I.	250,025	71	.....	.....	4	.....	6	.....	.....	6
Rochester, N. Y.	250,747	77	.....	.....	22	.....	1	.....	4	9
From 100,000 to 200,000 inhab- itants:											
Bridgeport, Conn.	118,434	.....	6	.....	1	.....	2	.....	3	2
Cambridge, Mass.	111,639	19	.....	.....	9	.....	10	.....	8	4
Camden, N. J.	104,349	.....	4	.....	1	.....	.....	.....	5	.....
Dayton, Ohio.	125,509	28	.....	.....	1	.....	2	.....	5	1
Fall River, Mass.	126,904	25	4	.....	1	.....	2	.....	2	1
Grand Rapids, Mich.	125,759	19	.....	.....	11	.....	.....	.....	28	.....
Hartford, Conn.	108,969	34	2	.....	1	.....	4	.....	17	1
Lowell, Mass.	112,124	35	.....	.....	5	.....	.....	.....	7	2
Lynn, Mass.	100,316	32	2	.....	9	.....	4	.....	6	2
Nashville, Tenn.	115,978	44	1	1	.....	.....	.....	.....	11	3
New Bedford, Mass.	114,694	38	1	1	13	.....	.....	.....	10	2
New Haven, Conn.	147,095	3	.....	.....	5	.....	3	.....	4	1
Oakland, Cal.	190,803	.....	5	1	.....	.....	.....	.....	6	5
Reading, Pa.	105,094	23	.....	.....	9	.....	1	.....	2	2
Richmond, Va.	154,674	49	.....	.....	2	.....	1	.....	1	3
Salt Lake City, Utah.	113,567	16	1	.....	2	.....	.....	.....	.....	.....
Springfield, Mass.	103,216	27	2	.....	14	.....	1	.....	5	1
Tacoma, Wash.	108,094	.....	1	.....	1	.....	.....	.....	.....	.....
Toledo, Ohio.	187,840	47	3	.....	18	.....	.....	.....	18	4
Trenton, N. J.	109,212	38	4	.....	3	.....	2	.....	5	3
Worcester, Mass.	160,523	44	1	1	1	.....	.....	.....	8	9
From 50,000 to 100,000 inhab- itants:											
Akron, Ohio.	82,958	.....	1	.....	1	.....	.....	.....	.....	1
Altoona, Pa.	57,606	.....	1	.....	.....	.....	.....	.....	.....	2
Atlantic City, N. J.	55,806	6	2	.....	6	.....	.....	.....	3	.....
Bayonne, N. J.	67,582	.....	.....	.....	5	.....	.....	.....	2	.....
Berkeley, Cal.	54,879	7	.....	.....	.....	.....	.....	.....	3	1
Binghamton, N. Y.	53,082	17	2	.....	1	.....	.....	.....	1	2
Brockton, Mass.	65,746	6	.....	.....	6	.....	.....	.....	1	.....
Canton, Ohio.	59,139	10	.....	.....	4	.....	7	.....	2	.....
Charleston, S. C.	60,427	27	.....	.....	.....	.....	.....	.....	.....	1
Duluth, Minn.	91,913	.....	.....	.....	.....	.....	10	.....	.....	3
Erie, Pa.	73,798	24	1	.....	.....	.....	.....	.....	6	.....
Evansville, Ind.	72,125	20	.....	.....	.....	.....	.....	.....	2	1
Harrisburg, Pa.	70,754	24	.....	.....	.....	.....	1	.....	.....	1
Johnstown, Pa.	66,585	.....	4	.....	5	.....	.....	.....	4	1
Kansas City, Kans.	96,854	.....	3	.....	4	.....	1	.....	5	2
Lancaster, Pa.	50,269	.....	5	.....	.....	.....	.....	.....	2	.....
Lawrence, Mass.	98,197	23	4	3	6	.....	.....	.....	4	.....
Little Rock, Ark.	55,158	25	.....	.....	.....	.....	1	.....	1	.....
Malden, Mass.	50,067	1	1	.....	10	.....	1	.....	3	.....

¹ Population Apr. 15, 1910; no estimate made.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Contd.

City Reports for Week Ended July 24, 1915—Continued.

City.	Population as of July 1, 1914. (Es- timated by United States Census Bureau.)	Total deaths from all causes.	Diph- theria.		Measles.		Scarlet fever.		Tubercu- losis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
From 50,000 to 100,000 inhab- itants—Continued.										
Manchester, N. H.	76,959	36					1		2	
Mobile, Ala.	56,536								1	1
Passaic, N. J.	69,010	20	2		8		3		3	
Pawtucket, R. I.	58,156									1
Sacramento, Cal.	64,846	21					2			1
Saginaw, Mich.	54,815	12								
San Diego, Cal.	51,115	13					3			2
Schenectady, N. Y.	95,265	13	1		1		2		1	
Somerville, Mass.	85,460	7			1		1		4	
South Bend, Ind.	67,030	14			6					1
Springfield, Ill.	59,468	14								
Wilkes-Barre, Pa.	75,218	23	2		7				2	
York, Pa.	59,543		1						4	
From 25,000 to 50,000 inhab- itants:										
Alameda, Cal.	27,031	7							1	
Auburn, N. Y.	36,947	16							1	2
Brookline, Mass.	31,934		2		3		1			
Butler, Pa.	26,587	9								
Butte, Mont.	42,918	14			3				2	
Chelsea, Mass.	32,452	15			6		1		2	
Chicopee, Mass.	28,688	6			2					
Clinton, Iowa	27,024	5							2	1
Cumberland, Md.	25,564	3							2	
Danville, Ill.	31,554	5	2						4	1
East Orange, N. J.	41,155	6			4				1	
Elgin, Ill.	27,844	4					3			
Everett, Mass.	38,307	5	5						2	
Everett, Wash.	33,767	5								2
Fitchburg, Mass.	41,144	3	1				1		2	1
Galveston, Tex.	41,076	24	2						1	1
Haverhill, Mass.	47,774	8			7		2		4	
Kalamazoo, Mich.	47,364	14		1					3	2
Kenosha, Wis.	30,319	6							1	
La Crosse, Wis.	31,522	7	2		2				2	1
Lexington, Ky.	39,703	11			2				9	3
Lynchburg, Va.	32,385	12							1	1
Madison, Wis.	30,084				5					
Medford, Mass.	25,737	4					1		2	
Montclair, N. J.	25,550	3	1		1				2	1
New Castle, Pa.	40,351		2				1		1	
Newport, Ky.	31,722	15							2	2
Newport, R. I.	29,631	3								
Newton, Mass.	43,085	4	2		4					
Niagara Falls, N. Y.	36,240	10			3					
Norristown, Pa.	30,833	6			2					
Ogden, Utah.	30,466	5								
Orange, N. J.	32,524	9							2	1
Pasadena, Cal.	43,859	9	3	1						1
Perth Amboy, N. J.	39,725		3		3				1	
Pittsfield, Mass.	37,580	4							1	1
Portsmouth, Ohio.	28,126	10								1
Racine, Wis.	45,507	17			7		1			2
Rock Island, Ill.	27,961	6	3	1					1	
Steubenville, Ohio.	26,631	15								
Stockton, Cal.	34,508				1		3		1	
Taunton, Mass.	35,957	13			5					1
Waltham, Mass.	30,129	9	2		7		1			3
Wheeling, W. Va.	43,097	15			6			1	2	
Williamsport, Pa.	33,495	5								
Wilmington, N. C.	28,264	8							1	2
From 10,000 to 25,000 inhab- itants:										
Ann Arbor, Mich.	14,979	8							6	
Braddock, Pa.	21,310				3					
Cairo, Ill.	15,593	4						1		
Concord, N. H.	22,480	6								
Galesburg, Ill.	23,923	9								

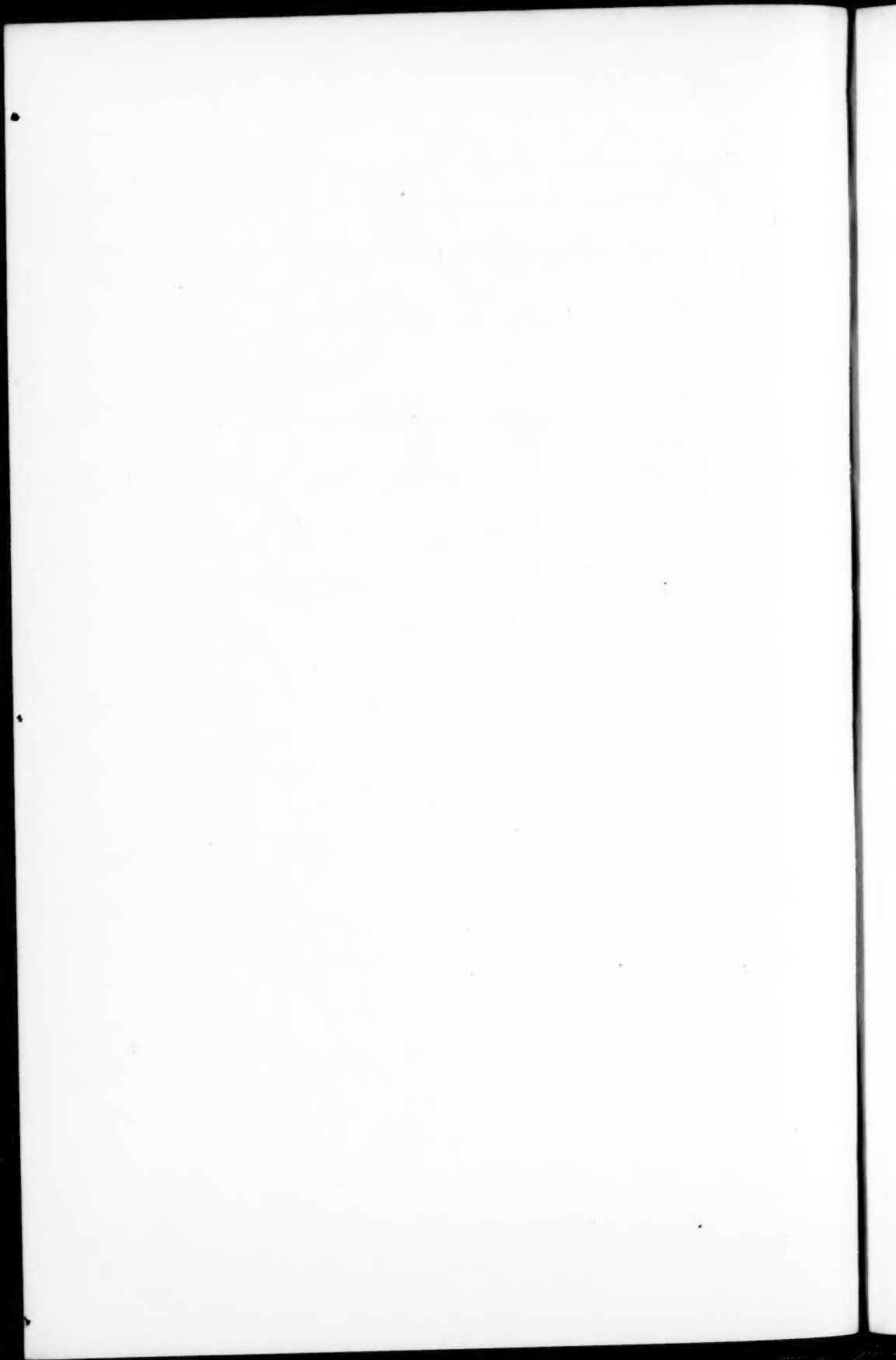
¹ Population April 15, 1910; no estimate made.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Contd.

City Reports for Week Ended July 24, 1915—Continued.

City.	Population as of July 1, 1914. (Es- timated by United States Census Bureau.)	Total deaths from all causes.	Diph- theria.		Measles.		Scarlet fever.		Tubercu- losis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
From 10,000 to 25,000 inhab- itants—Continued.										
Harrison, N. J.	16,555						1		1	
Kearny, N. J.	22,753	5	1		3					
Key West, Fla.	21,437	8								
Melrose, Mass.	17,166	5	1							2
Morristown, N. J.	13,158	3								1
Muscatine, Iowa.	17,287	4								
Nanticoke, Pa.	22,441	6	1		2					
Newburyport, Mass.	15,195	3								
New London, Conn.	21,771	2	2						3	
North Adams, Mass.	22,019	8								1
Northampton, Mass.	19,816	3					2		2	
Phoenix, Ariz.	17,798	2								
Plainfield, N. J.	23,280	9								1
Rutland, Vt.	14,624	3								
Saratoga Springs, N. Y.	12,812	4			3					
South Bethlehem, Pa.	23,522				2					
Steelton, Pa.	15,347	4			1				1	
Wilksburg, Pa.	22,361	6			1					1
Woburn, Mass.	15,862	6								

* Population Apr. 15, 1913; no estimate made.



FOREIGN REPORTS.

AUSTRIA-HUNGARY.

Cholera—Cholera Carriers.

Cholera has been notified in Austria-Hungary as follows:

Austria.—May 23 to June 5, 1915, 206 cases with 44 deaths.

Bosnia-Herzegovina.—May 16 to 29, 1915, 12 cases with 5 deaths.

Croatia-Slavonia.—May 24 to June 7, 1915, 47 cases with 15 deaths.

Hungary.—May 31 to June 13, 1915, 305 cases with 110 deaths.

During the period from May 23 to June 5, 1915, 6 cholera carriers were found in two districts of Bosnia-Herzegovina.

CHILE.

Plague—Coquimbo.

On August 7, 1915, two cases of plague were reported in Coquimbo, Chile.

CHINA.

Examination of Rats—Shanghai.

During the two weeks ended July 3, 1915, 476 rats were examined at Shanghai. No plague infection was found.

Plague—Amoy.

On June 14, 1915, the increase of plague at Amoy and the finding of dead rats in many districts of the city were reported. During the week ended June 26, 1915, it was estimated that 40 deaths from plague were occurring daily. One case was notified at Kulangsu, the international settlement, during the week ended June 26.

DUTCH EAST INDIES.

Batavia and Tandjong Priok Free From Cholera.

The ports of Batavia and Tandjong Priok, Java, were declared free from cholera June 5, 1915.

GERMANY.

Cholera.

During the period from June 13 to July 2, 1915, cholera was notified in Germany as follows: Jagerndorf, district of Breslau, 1 case; Rosenberg and Slaventzitz, district of Oppeln, 1 case each; Sachsenhausen, district of Wiesbaden, 1 case.

Typhus Fever.

Typhus fever has been notified in Germany as follows: Week ended June 26, 1915, 13 cases occurring among German soldiers. The cases were distributed in the Government districts of Erfurt, Oppeln, and Schleswig, and in Saxony, Saxe-Weimar, and Lubeck. Week ended July 3, 1915, 76 cases, occurring among soldiers in the Government districts of Cassel, Erfurt, Stettin, and Posen, and in Brunswick and Saxe-Weimar. The disease was reported present among prisoners of war in prison camps.

GREECE.**Plague—Zante.**

During the period from August 1 to 11, 1915, 12 cases of plague occurred at Zante, Greece.

RUSSIA.**Cholera—Caucasus.**

Cholera has been reported present in Caucasus, Russia.

TYPHUS FEVER.**Reports Received During Week Ended August 13, 1915.¹**

Place.	Date.	Cases.	Deaths.	Remarks.
Austria-Hungary:				
Austria.....	May 9-22.....	567	.....	Among soldiers, prisoners, and refugees.
Bosnia-Herzegovina.....	May 2-15.....	64	.....	Mainly among military.
China:				
Antung.....	June 28-July 4....	1	.....
Mukden.....	July 3.....	.....	.....	Present.
Dutch East Indies:				
Java—				
Batavia.....	June 6-19.....	18	4	
Germany.....	June 20-26.....	13	.....	Present among prisoners of war in prison camps.
Do.....	June 27-July 3....	76	.....	Do.
Great Britain and Ireland:				
Dublin.....	July 4-10.....	1	.....
Greece:				
Saloniki.....	June 20-July 3....	3	.....
Russia:				
Petrograd.....	June 6-19.....	1	2	
Spain:				
Madrid.....	June 1-30.....	.....	1	
Switzerland:				
Zurich.....	July 4-10.....	1	.....
Turkey in Asia:				
Jaffa.....	May 30-June 19...	4	4	

¹ From medical officers of the Public Health Service, American consuls, and other sources.

TYPHUS FEVER—Continued.

Reports Received from June 26 to August 6, 1915.

Place.	Date.	Cases.	Deaths.	Remarks.
Austria-Hungary:				
Austria.....	Apr. 25-May 8....	645		Mainly among soldiers, prisoners of war, and persons from Galicia; 6 among the civil population, of which 1 in Vienna.
Hungary:				
Budapest.....	May 16-June 12...	12	4	
Azores:				
Terceira.....	May 23-29.....	1		July 24, 1915; present.
Canary Islands:				
Santa Cruz de Tenerife.....	May 16-June 19....		2	
China:				
Hungtaohotze Station.....	Apr. 19-25.....	1		On Eastern Chinese Ry.
Mukden.....	June 6-12.....			Present.
Tientsin.....	.....do.....		1	
Cuba:				
Santiago.....	July 4-10.....	2	2	
Dutch East Indies:				
Java.....	Apr. 25-May 1....	13	3	Mid-Java.
Do.....	Apr. 27-May 10....	22	4	West Java.
Egypt:				
Alexandria.....	May 21-June 17....	119	35	
Cairo.....	May 7-June 3.....	70	95	
Port Said.....	.....do.....	2	3	
Germany.....	May 16-22.....	12		In German soldiers and 1 prison-camp employee; among prisoners of war in 14 districts and in Saxony and Hesse.
Do.....	June 6-19.....	20		Among military: Present in prison camps.
Aix la Chapelle.....	May 30-June 5.....		1	
Bremen.....	May 30-June 12....	1	1	
Breslau.....	May 30-June 5.....	5		
Koningsberg.....	June 6-12.....	3		
Leipzig.....	.....do.....		1	
Great Britain and Ireland:				
Dublin.....	May 23-June 12....	5		
Glasgow.....	May 29.....	1		
Newcastle.....	June 27-July 3....	1		
Greece:				
Athens.....	June 14-25.....		1	
Saloniki.....	May 30-June 19....		10	
Italy:				
Florence.....	May 1-31.....	5	1	
Turin.....	May 17-23.....	1		
Japan:				
Tokyo.....	June 7-13.....	2		
Mexico:				
Aguascalientes.....	June 21-27.....		1	
Russia:				
Moscow.....	May 2-June 5.....	148	42	
Petrograd.....	May 9-29.....	8		
Riga.....	Mar. 1-31.....	1	1	
Do.....	June 6-12.....	1		
Warsaw.....				Sept. 27-Oct. 31, 1914: Cases, 31; Nov. 1-28, 1914: Cases, 31; deaths, 1. Maximum incidence, Nov. 22-28: Cases, 20; deaths, 1.
Serbia.....	Apr. 27.....			Prevalent.
Switzerland:				
Zurich.....	May 30-June 5....	1		
Turkey in Asia:				
Adana.....	May 9-15.....			Present.
Beirut.....	May 27-June 2.....	2	1	
Harput.....	Apr. 1-30.....			Do.
Jaffa.....	Apr. 25-May 29....	11	3	
Mersina.....	May 9-29.....	2	2	
Tarsus.....	.....do.....			Do.
Trebizond.....				October, 1914-May 22, 1915: 6,000 fatal cases (estimated).
Tripoli.....	May 9-15.....	1	1	

CHOLERA, PLAGUE, AND SMALLPOX.

Reports Received During Week Ended August 13, 1915.¹

CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
Austria-Hungary:				
Austria.....	May 23-June 5....	206	44	
Bosnia-Herzegovina.....	May 16-29.....	12	5	
Croatia-Slavonia.....	May 24-June 7....	47	15	
Hungary.....	May 31-June 13....	305	110	
Germany:				
Breslau district—				
Jägerndorf.....	June 13-July 2....	1	.....
Oppeln—				
Rosenberg.....	do.....	1	.....
Slaventzitz.....	do.....	1	.....
India:				
Rangoon.....				May 1-31, 1915: 1 case, 1 death.
Indo China:				
Saigon.....	June 13-19.....	118	82	
Russia:				
Caucasus.....				Present.
Straits Settlements:				
Singapore.....	June 6-12.....	1	1	

PLAGUE.

Brazil:				
Bahia.....	June 20-26.....	1	1	
Chile:				
Coquimbo.....	Aug. 7.....	2	.....
China:				
Amoy.....	June 13-19.....			Increasing.
Do.....	June 20-26.....			40 deaths daily (estimated). At
				Kulungsu, international set-
				tlement, 1 case.
Hongkong.....	do.....	6	6	
Dutch East Indies:				
Java.....	June 21-July 3....	62	61	East Java.
Surabaya.....	May 30-June 12....	4	4	
Egypt:				
Fayoum, province.....	July 2-9.....	4	.....
Minieh, province.....	July 6-11.....	5	2	
Port Said.....	July 6-12.....	3	1	
India:				
Bassein.....	do.....		3	
Bombay.....	June 20-26.....	6	7	
Karachi.....	June 13-26.....	49	48	
Mandalay.....	June 6-12.....		1	
Moulmein.....	do.....		1	
Rangoon.....	June 13-19.....	12	13	May 1-31, 1915: Cases, 54; deaths, 53.
Indo China:				
Saigon.....	do.....	3	3	
Turkey in Asia:				
Bagdad.....	June 7-13.....	57	54	
Union of South Africa:				
Cape Province—				
Tarka, district.....	June 16.....	1	.....

SMALLPOX.

Australia:				
New South Wales—				
Cessnock.....	June 25-July 1....	1	.....
Kurri.....	do.....	4	.....
Standford Morthyr.....	do.....	1	.....
Canada:				
Toronto.....	July 18-24.....	1	.....
China:				
Nanking.....	June 27-July 3....			Present.
Shanghai.....	June 12-25.....		3	
Dutch East Indies:				
Java.....	May 30-June 12....	37	9	Mid Java.
Do.....	June 6-19.....	86	22	West Java.
Batavia.....	do.....		7	
Egypt:				
Alexandria.....	June 25-July 1....	4	1	

¹ From medical officers of the Public Health Service, American consuls, and other sources.

CHOLERA, PLAGUE, AND SMALLPOX—Continued.**Reports Received During Week Ended August 13, 1915—Continued.****SMALLPOX—Continued.**

Place.	Date.	Cases.	Deaths.	Remarks.
Germany.....				June 20-July 3, 1915: Cases, 8.
Government districts—				
Breslau.....	June 20-July 3.....	1		
Merseburg.....	do.....	1		
Oppeln.....	do.....	4		
Potsdam.....	do.....	2		
India:				
Bombay.....	June 20-26.....	10	5	
Pegu.....	June 6-12.....	1		
Rangoon.....	June 13-19.....	6	5	May 1-31, 1915: Cases, 37; deaths, 14.
Italy:				
Milan.....	May 1-31.....	1		
Mexico:				
Frontera.....	July 4-17.....	11	7	
Russia:				
Petrograd.....	June 6-19.....	79	30	
Riga.....	June 27-July 3.....	7		
Vladivostok.....	May 29-June 4.....	1		
Spain:				
Madrid.....	June 1-30.....		3	
Seville.....	do.....		3	
Valencia.....	July 3-17.....	17	1	
Switzerland:				
Basel.....	June 27-July 3.....	1		
Turkey in Asia:				
Haifa.....	June 14-20.....	1		

Reports Received from June 26 to August 6, 1915.**CHOLERA.**

Place.	Date.	Cases.	Deaths.	Remarks.
Austria-Hungary:				
Austria.....	May 2-22.....	33	8	July 3-17, 1915: 5 cases in Galicia.
Vienna.....	May 9-15.....	9	3	Among soldiers and prisoners.
Bosnia-Herzegovina.....	Apr. 25-May 15.....	116	41	96 cholera carriers in 3 localities.
Croatia-Slavonia.....	May 3-21.....	23	6	14 among soldiers.
Hungary.....	Apr. 26-May 31.....	205	77	May 16-23: 5 additional cases notified.
Ceylon:				
Colombo.....	Apr. 25-May 22.....	8	1	
China:				
Hongkong.....	May 2-8.....	1	1	
Dutch East Indies:				
Java—				
Batavia.....	Apr. 25-June 5.....	56	50	
Germany:				
Sachsenhausen.....	July 16.....	1	1	Corrected date: June 13-July 2.
India:				
Akyab.....	May 16-29.....		2	
Bassein.....	Apr. 18-June 5.....		22	Epidemic.
Bombay.....	June 6-12.....	2	2	
Calcutta.....	Apr. 25-June 5.....		141	
Madras.....	May 2-June 5.....	4	5	
Rangoon.....	Apr. 24-June 12.....	2	3	
Indo-China.....				Jan. 1-31, 1915: Cases, 284; deaths, 178.
Saigon.....	May 2-June 12.....	538	224	
Provinces—				
Anam.....	Jan. 1-31.....	3	2	
Cochin China.....	do.....	243	158	
Tonkin.....	do.....	38	18	
Serbia.....	June 25-July 2.....	2		
Siam:				
Bangkok.....	Apr. 19-May 15.....		4	
Straits Settlements:				
Singapore.....	May 9-15.....	1		

CHOLERA, PLAGUE, AND SMALLPOX—Continued.

Reports Received from June 26 to August 6, 1915—Continued.

PLAGUE.

Place.	Date.	Cases.	Deaths.	Remarks.
Bahrein, island.....	Apr. 1-30.....	.....	.....	Present.
Ceylon:				
Colombo.....	May 9-29.....	3	3	
China:				
Amoy.....	May 2-June 5.....	.....	.....	Present. Present in Sio-Khe
Hongkong.....	May 9-June 19....	46	40	Valley, 60 miles inland.
Dutch East Indies:				
Java.....				Jan. 1-Feb. 25, 1915: Cases, 2,094;
Do.....	Mar. 12-25.....	326	295	deaths, 1,864.
Do.....	Mar. 26-May 20....	582	521	
Surabaya.....	Apr. 18-May 29....	9	8	
Ecuador:				
Guayaquil.....	May 1-31.....	1	.....
Egypt.....				Jan. 1-May 20, 1915: Cases, 93;
Alexandria.....	May 21-27.....	.....	1	deaths, 48.
Assiout, province.....	May 14-June 3.....	7	2	
Fayoum, province.....	May 14-June 30....	45	9	
Gadiubeh, province.....	May 14-27.....	1	.....
Minieh, province.....	May 14-June 12....	5	3	
Port Said.....	May 28-June 10....	4	2	
Hawaii:				
Pauahau.....	June 29.....	1	.....
India:				
Bassein.....	Apr. 18-June 5.....	.....	55	
Bombay.....	May 2-June 12.....	111	100	
Calcutta.....	Apr. 25-June 5.....	.....	55	
Henzada.....	May 2-8.....	1	.....
Karachi.....	May 2-June 12.....	558	475	
Mandalay.....	Apr. 25-June 5.....	.....	2	
Moulmein.....	May 23-June 5.....	.....	4	
Myingyam.....	Apr. 5-17.....	.....	1	
Pegu.....	Apr. 18-May 1.....	.....	5	
Rangoon.....	Apr. 18-June 12....	83	51	Apr. 1-30, 1915: Cases, 40; deaths,
Toungoo.....	Apr. 25-May 1.....	.....	38	39.
Indo-China:				
Saigon.....	May 9-June 12....	7	3	Jan. 1-31, 1915: Cases, 73; deaths,
Provinces—				58.
Anam.....	Jan. 1-31.....	36	33	
Cambodia.....	do.....	18	18	
Cochin China.....	do.....	19	7	
Japan:				
Taiwan, island—				
Kagi.....	May 30-June 26....	6	5	
Tokyo.....	May 31-June 13....	5	5	
Persia:				
Mohammerah.....	Apr. 10-June 1....	3	.....
Peru:				
Callao.....	May 3-9.....	1	.....
Lima (city).....	do.....	1	.....
Mollendo.....	do.....	1	.....
Salaverry.....	Apr. 26-May 27....	2	.....	May 30. Vicinity.
Trujillo.....	May 3-9.....	2	.....	May 30. 7 cases in hospital.
Straits Settlements:				
Singapore.....	Apr. 25-June 5....	4	1	
Turkey in Asia:				
Bagdad.....	May 2-June 5.....	647	466	
Union of South Africa:				
Cape Province—				
Tarka, district.....	June 2.....	1	1	
Wodehouse, district.....	June 5.....	2	2	At Dordrecht.
Zanzibar:				
Zanzibar.....	Mar. 1-31.....	.....	1	

CHOLERA, PLAGUE, AND SMALLPOX—Continued.

Reports Received from June 26 to August 6, 1915—Continued.

SMALLPOX.

Place.	Date.	Cases.	Deaths.	Remarks.
Australia:				
New South Wales—				
New Castle District—				
Cessnock.....	June 10-17.....	3		
Kurri Kurri.....	May 26.....	2		
Victoria—				
Melbourne.....	Apr. 20.....	1		At Point Nepean quarantine station, from S. S. Lord Derby from Rangoon.
Western Australia—				
Fremantle.....	Apr. 27.....	1		At Woodmans Point quarantine station, from S. S. City of Baroda from Calcutta via Colombo.
Austria-Hungary:				
Austria.....	May 2-15.....	275		
Dalmatia, Province.....	May 2-8.....	1		
Vienna.....	May 23-June 3.....	22	7	Aug., 1914-May 8, 1915: Cases, 1,487; deaths, 316. May 9-15, 1915: Cases, 28.
Hungary—				
Budapest.....	May 2-June 12.....	265	1	
Brazil:				
Rio de Janeiro.....	Apr. 18-June 15.....	88	24	
Canada:				
Ontario—				
Hamilton.....	June 1-30.....	2	4	
Sarnia.....	June 13-19.....	1		
Toronto.....	June 6-26.....	5		
Quebec—				
Montreal.....	June 13-July 24.....	9		
Sherbrooke.....	June 1-30.....		1	
Ceylon:				
Colombo.....	May 2-29.....	21	7	
China:				
Chungking.....	May 23-June 19.....			Present.
Foochow.....	May 9-22.....			Do.
Hongkong.....	May 9-June 12.....	7	4	
Nanking.....	June 20-26.....			Do.
Shanghai.....	May 9-June 6.....	4	2	Natives.
Tientsin.....	May 16-22.....		1	
Dutch East Indies:				
Java.....	Apr. 18-June 5.....	106	29	Mid Java.
Do.....	Apr. 27-May 29.....	287	75	West Java.
Batavia.....	Apr. 25-May 22.....		22	Natives.
Egypt:				
Alexandria.....	May 21-June 17.....	33	11	
Cairo.....	Apr. 30-June 3.....	10	3	
Germany:				
Hamburg.....	June 6-12.....	1		
Government districts—				
Allenstein.....	June 13-19.....	1		
Arnsberg.....	.....do.....	1		
Danzig.....	.....do.....	2		
Gumbinnen.....	May 23-29.....	2		
Marienwerder.....	.....do.....	2		
Oppeln.....	May 16-June 12.....	3		
Posen.....	May 30-June 5.....	3		
Potsdam.....	June 13-19.....	1		
Great Britain:				
Bristol.....	Mar. 21-May 22.....	29	7	1 from vessel from Bombay. Maximum incidence, Apr. 4-17: Cases, 22; deaths, 2.
London.....	May 30-June 12.....	3		
Greece:				
Saloniki.....	May 23-29.....		1	
India:				
Basseln.....	May 2-8.....		1	
Bombay.....	May 2-June 12.....	158	86	
Calcutta.....	Apr. 25-June 5.....		237	
Karachi.....	May 2-June 12.....	23	4	
Madras.....	May 2-June 19.....	11	4	
Moulmein.....	May 23-29.....		1	
Pegu.....	Apr. 18-24.....		1	
Rangoon.....	Apr. 18-June 12.....	75	29	

CHOLERA, PLAGUE, AND SMALLPOX—Continued.

Reports Received from June 26 to August 6, 1915—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Indo-China, provinces:				
Anam.....	Jan. 1-31.....	23	5	Present.
Cambodia.....	do.....	12		
Cochin China.....	do.....	1	1	
Saigon.....	May 23-29.....	56	12	
Tonkin.....	Jan. 1-31.....			
Japan:				
Taiwan, island.....	May 23-29.....	1		
Mexico:				
Aguascalientes.....	June 7-July 4.....		8	Soldier from San Geronimo.
Frontera.....	May 23-July 3.....	87	31	
Mazatlan.....	June 23-July 13.....		3	
Monterey.....	June 14-July 4.....	6		
Progreso.....	June 6-July 17.....	4	1	
Salina Cruz.....	June 1-30.....	4	1	
Vera Cruz.....	June 7-July 10.....	44	24	
Portugal:				
Lisbon.....	May 23-July 3.....	20		
Russia:				
Moscow.....	May 2-15.....	19	5	Mar. 1-31; 1915: Cases, 80; deaths, 22.
Petrograd.....	May 8-29.....	95	29	
Riga.....	May 9-June 12.....	48		
Warsaw.....				
Serbia.....	Apr. 21-May 3.....	356		Sept. 27-Oct. 31, 1914: Cases, 51; deaths, 16. Nov. 1-28, 1914: Cases, 70; deaths, 23.
Spain:				
Seville.....	May 1-31.....		4	
Valencia.....	May 30-July 3.....	45	9	
Straits Settlements:				
Penang.....	Apr. 25-May 15.....	6	2	
Singapore.....	May 23-29.....	1		
Switzerland:				
Basel.....	May 16-June 19.....	17		
Turkey in Asia:				
Bagdad.....	May 2-8.....			Present.
Beirut.....	May 16-June 19.....	29	12	
Haifa.....	May 3-16.....	5		
Jaffa.....	May 9-29.....	2		
Mersina.....	May 30-June 5.....	1		
Tripoli.....	May 2-8.....			Do.

SANITARY LEGISLATION.

STATE LAWS AND REGULATIONS PERTAINING TO PUBLIC HEALTH.

FLORIDA.

Communicable Diseases—Dissemination of Information Concerning—Public Health Exhibit on Railway Car. (Chap. 6894, Act May 13, 1915.)

SECTION 1. The State board of health is hereby authorized to disseminate information concerning the cause, nature, extent, and prevention of communicable disease, and shall arrange for free lectures and health exhibits, and shall cause to be printed and distributed, free of cost to the people, bulletins, pamphlets, circulars, leaflets, cards, and other printed matter containing useful information for the protection of the individual and the public health.

Said board is further authorized to send a public health exhibit in a railway car or cars over the lines of railroads in this State, and shall cause the exhibit to be displayed in the cities and towns and other places in its discretion on such railway lines. With the display of the exhibit there may be given free lectures and talks to the people, illustrated, where possible, with stereopticon and moving pictures, and printed matter containing useful information pertaining to the protection of health and prevention of disease shall be distributed. The details of the work shall be planned by the said board, and the State health officer may employ assistants to carry on the work, for such periods of time as may be necessary, and shall fix their salaries. Necessary expenses of such employees shall be paid in the same manner that expenses of other employees of the State board of health are paid.

SEC. 2. It shall be lawful for any railroad company to furnish and transport, free of charge, a car or cars for the display of the public health exhibit, and to furnish free transportation to any such car or cars owned or used by said board, and to persons actually engaged in the work in connection with the display of the public health exhibit.

SEC. 3. It shall be lawful for any county, city, or town or the governing body of any county, city, or town to contribute to the local expense of the display of the public health exhibit.

SEC. 4. It shall be lawful for the State health officer to accept donations and contributions to the expense of the display of the public health exhibit.

SEC. 5. That all expenses incident to or necessary in the execution of any of the powers by the act vested in said State board of health or State health officer, or their employees or agents, shall be paid by said board out of the funds for the maintenance and support of said State board of health.

Schools—Adequate Toilet Facilities to be Provided—Construction of Toilets. (Chap. 6836, Act May 13, 1915.)

SECTION 1. That all school buildings, public or private, in this State shall be provided with adequate facilities for nature's conveniences, by either water carriage or surface closets, with separate compartments for each sex.

SEC. 2. That in rural districts where sewerage systems do not exist, all surface closets used in connection with such schools shall be of fly-proof construction and in conformity with plans recommended or approved by the State board of health, with separate compartments for each sex.

SEC. 3. That any public school board or any person, firm, or corporation conducting any private school, who shall have charge of the erection, repair, or maintenance of any school building, who shall fail to provide said buildings with the facilities required by section 1 of this act, or who shall fail to provide surface closets as required by section 2 of this act, shall be guilty of a misdemeanor, and upon conviction thereof shall be fined not exceeding \$50.

Flies—Screening Required in Public Eating Places and Dining Cars. Foodstuffs—Protection of, by Screening in Markets and Stores. (Chap. 6953, Act May 13, 1915.)

SECTION 1. On and after the passage of this act it shall be unlawful for any person, firm, or corporation to operate any hotel, boarding house, restaurant, or lunch counter within this State without keeping all doors, windows, and other similar openings in or to dining rooms, kitchens, or any other place where food is prepared or stored, and passageways between the same, and hallways leading thereto, screened with wire netting, with mesh sufficiently close to prevent the admission of flies.

SEC. 2. It shall be unlawful for any person, firm, or corporation to sell or offer for sale food for consumption in the raw state, or which may be consumed without further cooking at any meat shop, butcher shop, market, grocery store, fruit stand, or any other places where food is exposed for sale without having such food securely screened by wire netting with mesh sufficiently close to prevent the admission of flies.

SEC. 3. It shall be unlawful for any person, firm, or corporation to operate any dining or buffet car within this State without having all doors, windows, and other similar openings to the same securely screened with wire netting with mesh sufficiently close to prevent the admission of flies.

SEC. 4. It shall be the duty of the owner, tenant, operator, or person in charge of any of the foregoing described hotels, boarding houses, restaurants, lunch counters, meat shops, butcher shops, grocery stores, fruit stands, dining rooms, kitchens, dining or buffet cars, lunch counters, and other places to keep all flies out of the said places so far as may be possible.

SEC. 5. Any person, firm, or corporation found guilty of violating the provisions of this act shall be deemed guilty of a misdemeanor and upon conviction fined not exceeding \$50 or punished by imprisonment not exceeding three months. Each day's business conducted in violation of the provisions of this act shall constitute a separate offense.

Privies—Incorporated Towns—Required to be Fly Proof—Plans to be Recommended or Approved by State Board of Health. (Chap. 6895, Act May 18, 1915.)

SECTION 1. That any person, firm, or corporation keeping or maintaining surface closets and privies used for the deposit of human excreta within incorporated limits, which are not fly proof in construction and are not in conformity with plans recommended or approved by the State board of health, shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not exceeding \$10.

Births and Deaths—Registration of. (Chap. 6892, Act May 27, 1915.)

SECTION 1. That the State board of health shall have charge of the registration of births and deaths; shall furnish forms and blanks for obtaining and preserving such records and shall procure the faithful registration of the same in each primary registration district as constituted in section 3 of this act, and in the central bureau of vital

statistics at the office of the State board of health. The said board shall be charged with the uniform and thorough enforcement of the law throughout the State, and shall from time to time recommend any additional legislation that may be necessary for this purpose.

SEC. 2. That the central bureau of vital statistics, which is hereby authorized to be established by said board, shall be under the immediate direction of the State health officer who shall be by virtue of his office State registrar of vital statistics. The State board of health shall provide for such clerical and other assistants as may be necessary for the purposes of this act, and shall fix the compensation of persons thus employed, and shall provide for the bureau of vital statistics, suitable offices which shall be properly equipped with fireproof vault and filing cases for the permanent and safe preservation of all official records made and returned under this act.

SEC. 3. That for the purposes of this act the State shall be divided into registration districts as follows: Each city and each incorporated town shall constitute a primary registration district; and for that portion of each county outside of the cities and incorporated towns therein the State registrar shall define and designate the boundaries of a sufficient number of rural registration districts, which districts he may change, divide, or combine from time to time as may be necessary to insure the convenience and completeness of registration.

SEC. 4. That within 90 days after the taking effect of this act, or as soon thereafter as possible, the State registrar shall appoint a local registrar of vital statistics for each registration district in the State. The term of office of each local registrar so appointed shall be four years, and until his successor has been appointed and has qualified, unless such office shall sooner become vacant by death, disqualification, operation of law, or other causes: *Provided*, That in incorporated towns or cities where health officers or other officials are, in the judgment of the State registrar, conducting effective registration of births and deaths under local ordinances, such officials may be appointed as registrars in and for such incorporated towns or cities, and shall be subject to the instructions of the State registrar, and to all of the provisions of this act. Any vacancy occurring in the office of local registrar of vital statistics shall be filled for the unexpired term by the State registrar. At least 10 days before the expiration of the term of office of any such local registrar, his successor shall be appointed by the State registrar.

Any local registrar who, in the judgment of the State registrar, fails or neglects to discharge efficiently the duties of his office as set forth in this act, or to make prompt and complete returns of births and deaths as required thereby, shall be forthwith removed by the State registrar, and such other penalties may be imposed as are provided under section 22 of this act.

Each local registrar shall, immediately upon his acceptance of appointment as such, appoint a deputy, whose duty it shall be to act in his stead in case of his absence or disability; and such deputy shall in writing accept such appointment, and be subject to all instructions governing local registrars. And when it appears necessary for the convenience of the people in any district, the State registrar is hereby authorized, to appoint one or more suitable persons to act as subregistrars, who shall be authorized to receive certificates, to issue burial, removal, or other permits in and for such portions of the district as may be designated; and each subregistrar shall note, on each certificate, over his signature, the date of filing, and shall forward all certificates to the local registrar of the district within 10 days, and in all cases before the third day of the following month: *Provided*, That such subregistrar shall be subject to the supervision and control of the State registrar, and may be by him removed for neglect or failure to perform his duty in accordance with the provisions of this act or the instructions of the State registrar, and shall be subject to the same penalties for neglect of duty as the local registrar.

SEC. 5. That the body of any person whose death occurs in this State, or which shall be found dead therein, shall not be interred, deposited in a vault or tomb, cremated, or otherwise disposed of or removed from or into any registration district or be temporarily held pending further disposition more than 72 hours after death unless a permit for burial, removal, or other disposition thereof shall have been properly issued by the local registrar of the registration district in which the death occurred or the body was found. And no such burial or removal permit shall be issued by any registrar until, wherever practicable, a complete and satisfactory certificate of death has been filed with him as hereinafter provided: *Provided*, That when a dead body is transported from outside the State into a registration district in Florida for burial the transit or removal permit, issued in accordance with the law and health regulations of the place where the death occurred, shall be accepted by the local registrar of the district into which the body has been transported for burial or other disposition as a basis upon which he may issue a local burial permit; he shall note upon the face of the burial permit the fact that it was a body shipped in for interment, and give the actual place of death; and no local registrar shall receive any fee for the issuance of burial or removal permits under this act other than the compensation provided in section 20.

SEC. 6. That a stillborn child shall be registered as a birth and also as a death, and separate certificates of both the birth and death shall be filed with the local registrar, in the usual form and manner, the certificate of birth to contain in place of the name of the child the word "stillbirth": *Provided*, That a certificate of birth and a certificate of death shall not be required for a child that has not advanced to the fifth month of uterogestation. The medical certificate of the cause of death be signed by the attending physician, if any, and shall state the cause of death as "stillborn," with the cause of the stillbirth, if known, whether a premature birth, and, if born prematurely, the period of uterogestation, in months, if known; and a burial or removal permit of the prescribed form shall be required. Midwives shall not sign certificates of death for stillborn children; but such cases, and stillbirths occurring without attendance of a physician, shall be treated as deaths without medical attendance, as provided for in section 8 of this act.

SEC. 7. That the certificate of death shall be on the standard form approved by the United States Bureau of the Census, all of the items of which are hereby declared necessary for the legal, social, and sanitary purposes subserved by registration records. The personal and statistical particulars shall be authenticated by the signature of the informant, who may be any competent person acquainted with the facts.

The statement of facts relating to the disposition of the body shall be signed by the undertaker or person acting as such.

The medical certificate shall be made and signed by the physician, if any, last in attendance on the deceased, who shall specify the time in attendance, the time he last saw the deceased alive, and the hour of the day at which death occurred. And he shall further state the cause of death, so as to show the course of disease or sequence of causes resulting in the death, giving first the name of the disease causing death (primary cause), and the contributory (secondary) cause, if any, and the duration of each. Indefinite and unsatisfactory terms, denoting only symptoms of disease or conditions resulting from disease, will not be held sufficient for the issuance of a burial or removal permit; and any certificate containing only such terms, as defined by the State registrar, shall be returned to the physician or person making the medical certificate for correction and more definite statement. Causes of death which may be the result of either disease or violence shall be carefully defined; and if from violence, the means of injury shall be stated, and whether (probably) accidental, suicidal, or homicidal. And for deaths in hospitals, institutions, or of nonresidents, transients, or recent residents, the physician shall supply the information required under this head, if he is able to do so, and may state where in his opinion, the disease was contracted.

SEC. 8. That in case of any death occurring without medical attendance it shall be the duty of the undertaker or other person to whose knowledge the death may come to notify the local registrar of such death, and when so notified the registrar shall, prior to the issuance of the permit, inform the local health officer and refer the case to him for immediate investigation and certification: *Provided*, That when the local health officer is not a physician, or when there is no such official, and in such cases only, the registrar is authorized to make the certificate and return from the statement of relatives or other persons having adequate knowledge of the facts: *Provided further*, That if the undertaker, or person acting as such, or the registrar has reason to believe that the death may have been due to unlawful act or neglect, the registrar shall then refer the case to the coroner or other proper officer for his investigation and certification. And the coroner or other proper officer whose duty it is to hold an inquest on the body of any deceased person and to make the certificate of death required for a burial permit shall state in his certificate the name of the disease causing death, or, if from external causes, (1) the means of death; and (2) whether (probably) accidental, suicidal, or homicidal; and shall, in any case, furnish such information as may be required by the State registrar in order properly to classify the death.

SEC. 9. That the undertaker or person acting as undertaker shall file the certificate of death with the local registrar of the district in which the death occurred and obtain a burial, removal, or other permit prior to any disposition of the body. He shall obtain the required personal and statistical particulars from the person best qualified to supply them, over the signature and address of his informant. He shall then present the certificate of the attending physician, if any, or to the health officer or coroner, as directed by the local registrar, for the medical certificate of the cause of death and other particulars necessary to complete the record, as specified in sections 7 and 8. And he shall then state the facts required relative to the date and place of burial, other dispositions, or removal, over his signature and with his address, and present the complete certificate to the local registrar in order to obtain a permit for burial, removal, or other disposition of the body. The undertaker shall deliver the burial permit to the person in charge of the place of burial before interring or otherwise disposing of the body, or shall attach the removal and transit permit to the box containing the corpse when shipped by any transportation company; said permit to accompany the corpse to its destination, where if within the State of Florida, the removal permit shall be delivered to the person in charge of the place of burial.

Every person, firm, or corporation selling a casket shall keep a record showing the name of the purchaser, purchaser's post-office address, name of deceased, date of death, place of death, and color or race of deceased, which record shall be open to inspection of the State registrar at all times. On the first day of each month the person, firm, or corporation selling caskets shall report to the State registrar each sale for the preceding month on a blank provided for that purpose: *Provided, however*, That no person, firm, or corporation selling caskets to dealers or undertakers only shall be required to keep such record, nor shall such report be required from undertakers when they have direct charge of the disposition of a dead body.

Every person, firm, or corporation selling a casket at retail, and not having charge of the disposition of the body, shall inclose within the casket a notice furnished by the State registrar calling attention to the requirements of the law and a blank certificate of death.

SEC. 10. That if the interment, or other disposition of the body is to be made within the State, the wording of the burial or removal permit may be limited to a statement by the registrar, and over his signature, that a satisfactory certificate of death having been filed with him, as required by law, permission is granted to inter, remove, or dispose otherwise of the body, upon the form prescribed by the State registrar.

SEC. 11. That no person in charge of any premises on which interments or other dispositions are made shall inter or permit the interment or other disposition of any

body unless it is accompanied by a burial, other disposition, or removal permit as herein provided. Any such person shall indorse upon the permit the date of interment or other disposition, over his signature, and shall return all permits so indorsed to the local registrar of his district within 10 days from the date of interment or other disposition. He shall keep a record of all bodies interred or otherwise disposed of on the premises under his charge, in each case stating the name and color or race of each deceased person, place of death, date of burial or disposal, and name and address of the undertaker, which record shall at all times be open to official inspection: *Provided*, That the undertaker or person acting as such, when burying a body in a cemetery or burial grounds having no person in charge, shall sign the burial or removal permit, giving the date of burial, and shall write across the face of the permit the words "No person in charge," and file the burial or removal permit within 10 days with the registrar of the district in which the cemetery is located.

SEC. 12. That the birth of each and every child born in this State shall be registered as hereinafter provided.

SEC. 13. That within 10 days after the date of each birth there shall be filed with the local registrar of the district in which the birth occurred a certificate of such birth, as provided in section 14 of this act.

In each case where a physician, midwife, or person acting as midwife was in attendance upon the birth, it shall be the duty of such physician, midwife, or person acting as midwife to file in accordance herewith the certificate herein contemplated.

In each case where there was no physician, midwife, or person acting as midwife in attendance upon the birth, it shall be the duty of the father or mother of the child, the householder or owner of the premises where the birth occurred, or the manager or superintendent of the public or private institution where the death [birth?] occurred, each in the order named, within 10 days after the date of such birth, to report to the local registrar the fact of such birth. In such case and in case the physician, midwife, or person acting as midwife in attendance upon the birth is unable, by diligent inquiry, to obtain any item or items of information on the certificate of birth, it shall then be the duty of the local registrar to secure from the person so reporting, or from any other person having acquired knowledge, such information as will enable him to prepare the certificate of birth herein contemplated, and it shall be the duty of the person reporting the birth or who may be interrogated in relation thereto to answer correctly and to the best of his knowledge all questions put to him by the local registrar which may be calculated to elicit any information needed to make the complete record of the birth as contemplated; and it shall be the duty of the informant, as to any statement made in accordance herewith, to verify such statement by his signature.

SEC. 14. That the certificate of birth shall be on the standard form approved by the United States Bureau of the Census, all of the items of which are hereby declared necessary for the legal, social, and sanitary purposes subserved by registration records.

SEC. 15. That when any certificate of birth of a living child is presented without the statement of the given name, then the local registrar shall make out and deliver to the parents of the child a special blank for supplemental report of the given name of the child, which shall be filed out as directed, and returned to the local registrar as soon as the child shall have been named.

SEC. 16. That every physician, midwife, sexton, retail casket dealer, and undertaker shall, without delay, register his or her name, address, and occupation and color or race with the local registrar of the district in which he or she resides, or may hereafter establish a residence, and shall thereupon be supplied by the local registrar with a copy of this act, together with such instructions as may be prepared by the State registrar relative to its enforcement. Within 30 days after the close of each calendar year each local registrar shall make a return to the State registrar of all physicians, midwives, sextons, retail casket dealers, or undertakers who have registered in his district during the whole or any part of the preceding calendar year: *Provided*, That

no fee or other compensation shall be charged by local registrars to physicians, midwives, sextons, retail casket dealers, or undertakers for registering their names under this section or making returns thereof to the State registrar.

SEC. 17. That all superintendents or managers, or other persons in charge of hospitals, almshouses, lying-in or other institutions, public or private, to which persons resort for treatment of diseases, confinement, or are committed by process of law shall make a record of all the personal and statistical particulars relative to the inmates in their institutions at the date of the approval of this act, which are required in the forms of the certificates provided for by this act, as directed by the State registrar; and thereafter such record shall be by them made for all future inmates at the time of their admittance. And in case of persons admitted or committed for treatment or disease the physician in charge shall specify for entry in the record the nature of the disease, and where, in his opinion, it was contracted, or, if injured, the nature and cause thereof. The personal particulars and information required by this section shall be obtained from the individual himself if it is practicable to do so; and when they can not be so obtained, they shall be obtained in as complete a manner as possible from relatives, friends, or other persons acquainted with the facts.

SEC. 18. That the State registrar shall prepare, print and supply to all registrars all blanks and forms used in registering, recording and preserving the returns, or in otherwise carrying out the purposes of this act; and shall prepare and issue such detailed instructions as may be required to procure the uniform observance of its provisions and the maintenance of a perfect system of registration; and no other blanks shall be used than those supplied by the State registrar. He shall carefully examine the certificates received monthly from the local registrars, and if any such are incomplete or unsatisfactory he shall require such further information to be supplied as may be necessary to make the record complete and satisfactory. And all physicians, midwives, informants, or undertakers, and all other persons having knowledge of the facts, are hereby required to supply, upon a form provided by the State registrar or upon the original certificate, such information as they may possess regarding any birth or death, upon demand of the State registrar, in person, by mail or through the local registrar. The State registrar shall further arrange, bind and permanently preserve the certificates in a systematic manner, and shall prepare and maintain a comprehensive and continuous card index of all births and deaths registered; said index to be arranged alphabetically, in the case of deaths, by the names of the decedents, and in the case of births, by the names of fathers and mothers. He shall inform all registrars what diseases are to be considered infectious, contagious or communicable and dangerous to the public health, as decided by the State board of health, in order that when deaths occur from such diseases proper precautions may be taken to prevent their spread.

SEC. 19. That each local registrar shall supply blank forms to such persons as require them. Each local registrar shall carefully examine each certificate of birth or death when presented for record, in order to ascertain whether or not it has been made out in accordance with the provisions of this act and the instructions of the State registrar; and if any certificate of death is incomplete or unsatisfactory it shall be his duty to call attention to the defect in the return, and to withhold the burial, removal or other permit until such defects are corrected. All certificates, either of birth or of death, shall be written legibly in durable black ink, and no certificate shall be held to be complete and correct that does not supply all of the items of information called for therein, or satisfactorily account for their omission. If the certificate of death is properly executed and complete he shall then issue a burial, removal or other permit to the undertaker or the person acting as such: *Provided* That in case the death occurred from some disease which is held by the State board of health to be infectious, contagious or communicable and dangerous to the public health, no permit for the removal or other disposition of the body shall be issued by the registrar, except under such

conditions as may be prescribed by the State board of health. If a certificate of birth is incomplete the local registrar shall immediately notify the informant, and require him or her to supply the missing items of information if they can be obtained. He shall number consecutively the certificates of birth and death, in two separate series, beginning with number one for the first birth and the first death in each calendar year, and sign his name as registrar in attest of the date of filing in his office. He shall also make a complete and accurate copy of each birth and each death certificate registered by him in a record book supplied by the State registrar, to be preserved as the local record, in such manner as directed by the State registrar. And he shall, on the tenth day of each month, transmit to the State registrar all original certificates registered by him for the preceding months. And if no births or no deaths occurred in any month he shall, on the tenth day of the following month, report that fact to the State registrar, on a card provided for such purpose.

SEC. 20. That each local registrar shall be paid the sum of 25 cents for each birth certificate and each death certificate properly and completely made out and registered with him, and correctly recorded and promptly returned by him to the State registrar as required by this act. And in case no births or no deaths were registered during any month, the local registrar shall be entitled to be paid the sum of 25 cents for each report to that effect, but only if such report be made promptly as required by this act. All amounts payable to a local registrar under the provisions of this section shall be from the funds of the State board of health upon certification by the State registrar. And the State registrar shall annually certify to the treasurers of the several counties the number of births and deaths properly registered, with the names of the local registrars and the amounts due each at the rates fixed herein.

SEC. 21. That the State registrar shall, upon request, supply to any applicant a certified copy of the record of any birth or death registered under provisions of this act, for the making and certification of which he shall be entitled to a fee of 50 cents, to be paid by the applicant. And any copy of the record of a birth or death, when properly certified by the State registrar, shall be prima facie evidence in all courts and cases of the facts therein stated. For any search of the files and records when no certified copy is made, the State registrar shall be entitled to a fee of 50 cents for each hour or fractional part of an hour of time of search, said fee to be paid by the applicant. *Provided*, That the State board of health may waive any or all of the fees required under this section. And the State registrar shall keep a true and correct account of all fees by him received under these provisions, and turn the same over to the State treasurer.

SEC. 22. That any person, who for himself or as an officer, agent, or employee of any other person, or of any corporation or partnership, shall refuse or neglect to perform any of the duties required by this act, instructions and directions of the State registrar, or rules and regulations of the State board of health, or who shall violate any of the provisions of this act, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than \$5 nor more than \$100.

SEC. 23. That each local registrar is hereby charged with the strict and thorough enforcement of the provisions of this act in his registration district, under the supervision and direction of the State registrar. And he shall make an immediate report to the State registrar of any violation of this law coming to his knowledge, by observation or upon complaint of any person or otherwise.

The State registrar is hereby charged with the thorough and efficient execution of the provisions of this act in every part of the State, and is hereby granted supervisory power over local registrars, deputy registrars, and subregistrars, to the end that all of its requirements shall be uniformly complied with. The State registrar, either personally or by an accredited representative, shall have authority to investigate cases of irregularity or violation of law, and all registrars shall aid him, upon request, in such investigations. When he shall deem it necessary he shall report cases of

violations of any of the provisions of this act to the State's attorney, county solicitor, or county attorney or other prosecuting officer having charge of the prosecution of misdemeanors in the registration district in which such violation shall occur, with a statement of the facts and circumstances; and when any such case is reported to him by the State registrar the said prosecuting officer shall forthwith initiate and promptly follow up the necessary court proceedings against the person or corporation responsible for the alleged violation of law. And upon request of the State registrar the attorney general shall assist in the enforcement of the provisions of this act.

SEC. 24. That the State board of health shall have the power to adopt, promulgate, and enforce rules and regulations requiring the notification of all cases of sickness necessary for the preservation and protection of the public health, and for the collection of statistics of marriages and divorces.

Schools—Medical Inspection of Pupils. (Chap. 6829, Act June 4, 1915.)

SECTION 1. The State board of health shall have supervision over all matters pertaining to the medical inspection of school children in Florida, with such duties and powers as are prescribed by law pertaining to public health; and all school children shall be examined as to their physical condition at least once during each school year.

SEC. 2. It shall be the duty of the State board of health, as soon after the passage of this act as practicable, to formulate and adopt such rules and regulations as will be necessary to provide for thorough and uniform medical inspection of school children in Florida, as provided in section 1 of this act.

SEC. 3. The county physicians of each county in the State of Florida shall act as county medical inspectors of school children in their respective counties, providing that in such counties where there are no regular appointed county physicians it shall be the duty of the board of county commissioners to appoint a physician as county medical inspector of school children: *Provided further*, That the county physician or county medical inspector of school children be paid for their services out of the State board of health funds: *Provided further*, That no one physician shall have more than 2,500 school children under his charge, and in counties having more than 2,500 school children there shall be two medical inspectors of school children appointed, as aforesaid.

SEC. 4. The provisions of this act shall not affect cities of over 5,000 inhabitants where medical inspection of school children has already been established under the jurisdiction of the city board of health, provided that the city board of health adopt the forms prescribed by the State board of health and make full report to the State board of health.

SEC. 5. The expenditures of the State board of health for the purpose of carrying out the provisions of this act shall be certified by the president of the State board of health, and he shall make an annual report to the governor of all such expenditures, together with any special observations, recommendations, or facts that he may present, showing the value of medical school inspection from a public health standpoint or from a standpoint of educational efficiency, or otherwise, and such annual statements shall finally be submitted by the governor to the State legislature, when in regular session convened, and shall be published like other reports of State officers. The accounts necessary to carry out the provisions of this act shall be approved, audited, and paid in the same manner as is prescribed for the payment of other accounts of the State board of health and out of the State board of health funds.

MUNICIPAL ORDINANCES, RULES, AND REGULATIONS PERTAINING TO PUBLIC HEALTH.

NEW YORK, N. Y.

Lodging Houses—Permit, Overcrowding, Ventilation, Baths, Water-closets, Cleanliness, Spittoons, etc. (Reg. Dept. of Health, Mar. 30, 1915.)

Regulations of the department of health of the city of New York, adopted March 30, 1915, effective April 1, 1915, relating to section 334 of the Sanitary Code which provides as follows:

SEC. 334. *Lodging houses regulated.*—No lodging house containing rooms in which there are more than three beds for the use of lodgers, or in which more than six persons are allowed to sleep, shall be conducted, maintained, or operated in the city of New York without a permit therefor issued by the board of health or otherwise than in accordance with the terms of the said permit and the regulations of the said board.

REGULATION 1. *Information to be given in application.*—The applicant must file with this department, in duplicate, a written application, dated, signed by himself, and correctly setting forth—

(a) The full name and address of the proprietor of the lodging house and of the owner of the premises.

(b) The location of the lodging house.

(c) Whether or not the building or any part thereof was used as a lodging house prior to January 1, 1898.

(d) The portions of the building it is intended to use as a lodging house.

REG. 2. *Certificates from the fire department and bureau of buildings required.*—The applicant shall procure from the fire department of the city of New York and the bureau of buildings of the borough of said city in which the lodging house is located, respectively, a certificate to the effect that the premises for which a permit is desired complies with all fire and building laws, ordinances, and regulations applicable to lodging houses. Such certificates shall be filed with the department of health at the time the application is made for the permit.

REG. 3. *Permit to be displayed.*—The permit of the department of health issued for such lodging house shall be continuously and conspicuously displayed in the office or hall of such lodging house.

REG. 4. *Number of lodgers permitted.*—(a) No keeper of a lodging house shall receive lodgers therein without displaying continuously and conspicuously in each sleeping room a card issued for said room by the department of health, setting forth the greatest number of lodgers it is permitted to accommodate in said room, and also a copy of these regulations.

(b) No keeper of a lodging house shall accommodate in any sleeping room thereof a number of lodgers greater than the number set forth on the card issued for said room by said department; nor shall he accommodate any lodger in any room in which a card, duly issued therefor, is not displayed as above described.

REG. 5. *Ventilation.*—(a) In every lodging house each room shall be adequately ventilated as required by law and to the satisfaction of the department of health.

(b) In every sleeping room there shall be provided not less than 400 cubic feet of air space per bed.

(c) Neither side of any bed shall be at any time nearer than 2 feet to the side of any other bed.

(d) All beds shall be so arranged that the air shall circulate freely under each of them.

(e) In the case of all lodging houses for which permits are for the first time applied for after the year 1910, no beds or bunks shall be placed one above another.

REG. 6. *Airing, etc.*—(a) Except when extreme severity of the weather prevents, all windows of sleeping rooms, water-closets, wash rooms, and bathrooms shall be kept open not less than 1 foot at the bottom and 1 foot at the top at least four hours daily.

(b) Beds occupied at night shall be vacated by 10 a. m. or 12 m., and the bedding thereof shall be turned over and exposed to the air from 10 a. m. to 2 p. m. or from 12 m. to 4 p. m. daily, as shall be prescribed by the permit issued for each lodging house.

(c) For the accommodation of lodgers working by night, special beds or rooms shall be set apart for their use during the day, but the bedding of such beds must be turned over and exposed to the air in a room with outside windows, open as above prescribed, for at least four consecutive hours daily.

(d) Only servants at work or day sleepers that work at night shall be allowed in sleeping rooms between 10 a. m. and 2 p. m. or 12 m. and 4 p. m.

REG. 7. *Beds and bedding.*—(a) In every lodging house there shall be provided for each lodger a separate bed with bedstead, bedding, and bedclothes satisfactory to the department of health.

(b) All mattresses shall be provided with waterproof coverings, and shall be so arranged as to be at all times easily capable of thorough inspection.

(c) All beds, bed clothing, mattresses, and pillows shall always be kept clean and free from vermin.

(d) Sheets and pillowcases shall be kept in a condition clean and satisfactory to the department of health.

(e) In the case of all lodging houses for which permits are for the first time applied for after the year 1910, the frames of all beds shall be of metal.

REG. 8. *Water-closets.*—(a) In every lodging house there shall be provided water-closets in the ratio of at least 1 water-closet to every 15 beds or fraction thereof.

(b) In every lodging house for which a permit shall be first applied for after February 1, 1911, there shall be provided at least one water-closet on each floor, and water-closets shall be provided on every floor in the ratio of at least 1 to every 15 beds or fraction thereof on such floors.

(c) Every water-closet shall be properly ventilated by an unobstructed opening to the outer air.

(d) No gas or offensive odors shall be allowed to escape from any water-closet, sewer, or outlet into any sleeping room or part thereof. Each water-closet shall be provided with a self-closing door, which shall be cut away at the bottom so as to provide adequate ventilation.

(e) In no lodging house shall any person be allowed to sleep in a room in which there is a water-closet.

(f) In every lodging house for which a permit shall be first applied for after February 1, 1911, there shall be provided at least one wash room on each floor.

(g) In every lodging house there shall be provided wash rooms with running water, set washbasins or other individual washing appliances satisfactory in character to the department of health. Such individual appliances shall be provided in proportion to the number of beds in the lodging houses, as follows: One such appliance for every 10 beds or fraction thereof.

REG. 9. *Baths.*—(a) In every lodging house shower baths shall be provided in the ratio of at least 1 shower bath for every 50 beds or fraction thereof, or tub baths shall be provided in the ratio of at least 1 tub bath to every 25 beds or fraction thereof.

(b) All such baths shall be provided with hot and cold running water, and shall be at all times accessible for the use of lodgers free of charge.

REG. 10. *Water and towels.*—An adequate supply of water and clean individual towels shall be provided. The use of common towel is prohibited.

REG. 11. *Floors and walls of water-closets, etc.*—In every lodging house the floors of all water-closets, wash rooms, and bathrooms, and the walls thereof to a height of at least 4 feet above the floor, shall be constructed of such durable, waterproof material as may be approved by the department of health.

REG. 12. *Cleanliness.*—(a) Every lodging house and every part thereof shall be at all times kept clean and free from dirt, filth, garbage, and rubbish in or on the premises belonging to or connected with the same.

(b) All water-closets, washbasins, baths, windows, fixtures, fittings, and painted surfaces shall be at all times kept thoroughly clean and in good repair.

(c) The floors, walls, and ceilings of all rooms, passages, and stairways must be at all times kept clean and in good repair.

(d) If painted with oil, all walls and ceilings shall be thoroughly washed with soap and water at least twice yearly, and at such other times as the department of health may direct.

REG. 13. *Spitting and cuspidors.*—(a) In each hall room, cubicle, water-closet, wash room and bathroom of every lodging house there shall be provided a sufficient number of cuspidors or spittoons.

(b) In every such room, etc., there shall be continuously and conspicuously displayed a sign: "SPITTING FORBIDDEN EXCEPT IN PROPER RECEPTACLES."

(c) All such cuspidors or spittoons shall be of durable waterproof material and shall be thoroughly cleaned at least once daily, and shall be at all times maintained in a condition satisfactory to the department of health.

REG. 14. *Method of sweeping regulated.*—Sweeping of any portion or portions of such lodging houses shall be so performed as to avoid the raising of dust in the process. Dry sweeping prohibited.

REG. 15. *Illness.*—It shall be the duty of the keeper, agent, or owner of every lodging house to immediately report to the department of health the occurrence of any illness in such house.

REG. 16. *No women or children lodged.*—In no lodging house in which men are lodged shall any woman or girl be lodged, or any boy under the age of 16 years, unless accompanied by his father or legal male guardian.

Bathing Places—Establishment and Maintenance. (Reg. Dept. of Health, Mar. 30, 1915.)

Regulations of the department of health of the city of New York adopted March 30, 1915, effective April 1, 1915, relating to section 340 of the Sanitary Code, which provides as follows:

SEC. 340. *Bathing establishments regulated.*—Bathing suits shall not be hired out, nor shall any bathing establishment be maintained in the city of New York without a permit therefor, issued by the board of health, or otherwise than in accordance with the terms of said permit and the regulations of said board.

GENERAL REGULATIONS GOVERNING THE CONDUCT OF BATHING ESTABLISHMENTS.

REGULATION 1. *Water-closet accommodations.*—Suitable and adequate water-closet accommodations for each sex, conveniently located in properly ventilated compartments approved by the department of health, shall be provided. Such water-closets and water-closet compartments shall be maintained in a clean and sanitary condition, so as not to cause a nuisance or to contaminate the water used by bathers.

REG. 2. *Bathing suits, towels, etc., to be sterilized.*—Suitable and adequate facilities, approved by the department of health, shall be provided for sterilizing bathing suits, towels, shoes, stockings, caps, or other articles used when hired to patrons of the

establishment. All such articles after being once used shall be sterilized before again being used or rehired.

REG. 3. *Drinking water to be provided.*—An adequate supply of drinking water shall be provided for bathers. Water from wells in the Borough of Manhattan shall not be used for drinking water; from wells in the other boroughs (other than the public water supply) shall not be used without a permit from the board of health.

REG. 4. *Sanitary condition of premises to be maintained.*—The bathhouses and the premises on which the bathing establishment is located shall be maintained in a cleanly and sanitary condition.

REG. 5. *Regulations to be kept posted.*—The regulations of the department of health governing bathing establishments shall be kept posted in a conspicuous place inside of the establishment.

ADDITIONAL REGULATIONS GOVERNING THE CONDUCT OF BATHING ESTABLISHMENTS
USING WATER OTHER THAN RIVER WATER.

REG. 6. *Pools, plunges, and mikvehs to be emptied and cleaned.*—The pools, plunges, and mikvehs shall be emptied daily and the bottom and side walls of same thoroughly scrubbed before refilling. The water of the pools, plunges, and mikvehs shall be maintained in a condition suitable for bathing purposes at all times.

REG. 7. *Stairs and stair supports to pools, etc.*—The stairs and stair supports leading to pools, plunges, and mikvehs shall be made of metal, stone, or cement.

REG. 8. *Floors to be impervious.*—The floors of bathrooms shall be made impervious to dampness, and where so ordered by the department of health graded to properly trapped sewer or cesspool connected to drains.

REG. 9. *Side walls of bathrooms to be protected.*—The side walls of bathrooms shall be painted with two coats of white enamel paint or covered with nonabsorbent material to a height of at least 6 feet above the floor.

REG. 10. *Waste to discharge outside of the pool, etc.*—The waste water from showers, tubs, dressing rooms, water-closets, sinks, and platforms shall be discharged outside of the pools, plunges, or mikvehs.

REG. 11. *Mats to be of rubber.*—When mats are used, they shall be made of rubber.

REG. 12. *Cushions and mattresses to be covered.*—All cushions and mattresses shall be covered with nonabsorbent material.

REG. 13. *Clean towels to be provided.*—Clean individual towels shall be provided for each person.

REG. 14. *Persons with infectious diseases to be prohibited from entering pools, etc.*—Persons suffering from any form of contagious, communicable, or infectious disease shall not be permitted to enter or use pools, plunges, or mikvehs.

REG. 15. *Bathers to take shower baths.*—Every bather, before being allowed access to pools, plunges, or mikvehs shall be required to take a cleansing shower, using warm water and soap, and to use the toilet accommodations.

REG. 16. *Bathers not to commit a nuisance.*—Bathers shall not commit or be permitted to commit any form of nuisance in pools, plunges, or mikvehs.

ADDITIONAL REGULATIONS GOVERNING THE CONDUCT OF FLOATING BATHS AND STATIONARY POOL BATHS USING FOR BATHING PURPOSES THE WATERS ALONG THE HUDSON RIVER, THE HARLEM RIVER, OR TO THE WEST ON A LINE DRAWN BETWEEN FORT SCHUYLER AND WILLETT'S POINT, OR NORTH OF A LINE DRAWN BETWEEN NORTON'S POINT, CONEY ISLAND, AND THE NORTHERLY BOUNDARY OF THE FORT WADSWORTH RESERVATION ON STATEN ISLAND, OR IN THE ARTHUR KILLS ON THE WEST OF STATEN ISLAND, THE KILL VON KULL, AND THE UPPER BAY.

REG. 17. *Baths to be water-tight.*—The floating baths or stationary pool baths shall be maintained water-tight, so as to prevent contamination of the contents of the pool by external sources.

REG. 18. *Water to be filtered and treated.*—Wherever floating baths or stationary pool baths are maintained for the public within the area above described, the water of the pool shall be maintained in a condition suitable for bathing purposes at all times; when river or harbor water is used, it shall be filtered through sand or other mechanical means of separation, and then be so treated by the use of hypochlorite of lime, ultra violet rays, or other means approved by the department of health, as to render it clean and sanitary.

REG. 19. *Waste water to be discharged outside of pool.*—The waste water from showers, tubs, dressing rooms, water-closets, sinks, and platforms shall be discharged outside of pool.

REG. 20. *Persons with infectious disease to be prohibited from entering pool.*—Persons suffering from any form of contagious, communicable, or infectious disease, shall not be permitted to enter or use the pools.

REG. 21. *Bathers to take shower baths.*—Every bather before being allowed access to the pools shall be required to take a cleansing shower, using water and soap, and shall be required to use the toilet accommodations.

REG. 22. *Bathers shall not commit a nuisance.*—Bathers shall not commit or be permitted to commit any form of nuisance in the pools.

ADDITIONAL REGULATIONS GOVERNING THE CONDUCT OF BEACH BATHING ESTABLISHMENTS.

REG. 23. *Location of beach bathing establishments restricted.*—No permit shall be issued for the maintenance of a beach bathing establishment along that portion of the water front of the city of New York included within the following designated boundary lines:

1. *Borough of Manhattan.*—(a) From the Ship Canal at Spuyten Duyvil, along the Hudson River, to the Battery. (b) From the Battery along the East River, to the Harlem River. (c) From the Hudson River, along the Ship Canal at Spuyten Duyvil and the Harlem River, to the East River.

2. *Borough of The Bronx.*—(a) From the boundary line between the cities of New York and Yonkers, along the Hudson River, to the Ship Canal at Spuyten Duyvil. (b) From the Hudson River, along the Ship Canal at Spuyten Duyvil and the Harlem River, to the East River. (c) From the Harlem River, along the East River, to Fort Schuyler.

3. *Borough of Queens.*—From Willets Point, along the East River, to Newtown Creek, including Little Bay, Powells Cove, Flushing Bay, and Bowery Bay.

4. *Borough of Brooklyn.*—From Newtown Creek, along the East River, Upper New York Bay, including Gowanus Bay, the Narrows, and Gravesend Bay, to Nortons Point, Coney Island.

5. *Borough of Richmond.*—(a) From Tottenville, along the Arthur Kills and Kill Van Kull River, to New Brighton. (b) From New Brighton, along the Upper New York Bay and the Narrows, to the northerly boundary of Fort Wadsworth Reservation.

REG. 24. *Bathing beach near sewer outlet prohibited.*—No bathing beach shall be maintained within 500 feet of the point of discharge of the outlet of any sewer, the flow of which would contribute in any way to the pollution of the waters used by bathers.

REG. 25. *Life lines and danger signs to be provided.*—Life lines and danger signs must be provided in accordance with the provisions of section 340 of the Sanitary Code.

REG. 26. *Surf boat, life lines, etc., to be provided.*—A surf boat, not less than 16 feet long, shall be provided, on each side of which there shall be hanging ropes arranged so that persons in the water can easily catch hold of same or be supported thereby. Such boats shall be equipped with two or more sets of oars and life lines and life belts and at least one ring buoy or life preserver with quarter-inch cotton line not less than 500 feet in length with suitable reel attached thereto.

At such bathing establishments where there are equipments for 200 bathers or more, said surf or life boat shall be stationed in the water opposite the lines, manned and in readiness for use during the bathing hours.

REG. 27. *Reel and life lines to be provided on shore.*—There shall be anchored on the shore a suitable reel with a half-inch cotton line not less than 500 feet in length with a life belt attached thereto, kept in good order and in proper condition so that it can readily be used by those assisting in saving life.

REG. 28. *Life guard to be in attendance.*—A bathing master or life guard who shall be an expert swimmer and who shall be in constant and watchful attendance during bathing hours shall be stationed at every such bathing establishment.

Slaughterhouses—Regulation of. (Reg. Dept. of Health, Mar. 30, 1915.)

Regulations of the department of health of the city of New York, adopted March 30, 1915, effective April 1, 1915, relating to sections 325 and 326 of the Sanitary Code, which provides as follows:

SEC. 325. *Business of slaughtering cattle, sheep, swine, pigs, calves, and fowl regulated.*—The business of slaughtering cattle, sheep, swine, pigs, calves, or fowl shall not be conducted in the city of New York without a permit therefor issued by the board of health or otherwise than in accordance with the terms of said permit and with the regulations of said board. It shall not be unlawful, however, to slaughter cattle, sheep, swine, pigs, or calves in the Borough of Brooklyn, at such places where such business was established and carried on on January 3, 1898.

SEC. 326. *Business of slaughtering cattle, sheep, swine, pigs, and calves restricted in the Borough of Manhattan.*—The business of slaughtering cattle, sheep, or calves shall not be conducted in the Borough of Manhattan except in that part of the said borough bounded by the west side of Eleventh Avenue, the middle line of the block between West Thirty-eighth and West Thirty-ninth Streets (west of Eleventh Avenue), the North River, and the south side of West Forty-first Street; and in that part of the said borough bounded by the east side of First Avenue, the middle line of the block between East Forty-second Street and East Forty-third Street (east of First Avenue), the East River, and the south side of East Forty-seventh Street.

The business of slaughtering swine and pigs shall not be continued in the Borough of Manhattan except in that part of the said borough bounded by the west side of Eleventh Avenue, the middle line of the block between West Thirty-eighth and West Thirty-ninth Streets (west of Eleventh Avenue), the North River, and the south side of West Forty-first Street.

REGULATIONS GOVERNING THE CONDUCT OF CATTLE SLAUGHTERHOUSES.

REGULATION 1. *Room for use of inspectors to be provided.*—Office room, including light and heat, shall be provided by establishments, rent free, for the exclusive use of the inspector and other employees of the department of health assigned thereto. The room or rooms set apart for this purpose shall meet with the approval of the inspector in charge and shall be conveniently located, properly ventilated, and provided with lockers suitable for the protection and storage of department of health supplies and with facilities suitable for the dressing of inspectors and other employees of the department of health.

REG. 2. *Time of slaughtering.*—Each establishment shall inform the inspector in charge when work has been concluded for the day and of the day and hour when work will be resumed therein. Whenever any meat or product is to be overhauled, or otherwise handled, in the establishment during unusual hours, the establishment shall, a reasonable time in advance, notify the inspector in charge, of the day and hour when such work will be commenced and such articles shall not be so handled

except after such notice has been given. No department of an establishment shall be operated except under the supervision of a duly authorized officer or inspector of the department of health. All slaughtering of animals and preparation of meat and products shall be done within reasonable hours and with reasonable speed, the facilities of the establishment being considered. No delivering of any meat or product shall be made from an establishment until after due notice has been given to the inspector in charge or his assistant.

REG. 3. *Inspector to designate time of slaughtering.*—When one inspector is detailed to inspect the work at two or more establishments, where few animals are slaughtered or where but a small quantity of meat or product is prepared, the inspector in charge may designate the hours during which said establishment may be operated.

REG. 4. *Facilities to be provided inspector.*—When required by the director of the bureau, or inspector in charge, the following facilities and conditions, and such others as may be essential to efficient conduct of inspection, shall be provided by each establishment.

(a) Satisfactory pens, equipment, and assistants for conducting ante mortem inspection and for separating, marking, and holding apart from passed animals those marked "D. H. Suspect" and those marked "D. H. Condemned."

(b) Sufficient natural light, and abundant artificial light at times of the day when natural light may not be adequate, at places of inspection. Such places must be kept sufficiently free of steam and vapors for inspection to be properly made.

(c) Racks, receptacles, or other suitable devices, for retaining such parts as the head, tongue, tail, thymus gland, and viscera, and all parts and blood to be used in the preparation of meat food products or medical products, until after the post-mortem examination is completed, in order that they may be identified in case of condemnation of the carcass; equipment, trucks, and receptacles, for the handling of viscera of slaughtered animals so as to prevent contact with the floor; trucks, racks, marked receptacles, or other necessary equipment, for the separate and sanitary handling of carcasses or parts passed for sterilization.

(d) Tables, benches, and other equipment, on which inspection is performed, of such design, material, and construction, as to enable the inspectors of the department of health to conduct their inspection in a ready, efficient, and cleanly manner.

(e) Sanitary water-tight metal trucks or receptacles for holding and handling diseased carcasses and parts; such trucks or receptacles to be marked in a conspicuous manner with the phrase "D. H. Condemned" in letters not less than two inches high, and when required by the inspector in charge, to be equipped with facilities for locking or sealing.

(f) Adequate arrangements, including disinfectants, for cleansing and disinfecting hands, for sterilizing all implements used in dressing diseased carcasses, and for disinfecting hides, floors, and such other articles and places as may be contaminated by diseased carcasses, or otherwise.

(g) In establishments in which slaughtering is done; rooms, compartments, or specially prepared open places, to be known as "final inspection places," at which the final inspection of retained carcasses shall be conducted. Final inspection places shall be sufficient in size and their rail arrangement, and other equipment, shall be adequate to prevent carcasses and parts passed for food or sterilizing from being contaminated by contact with condemned carcasses or parts. They shall be equipped with hot water, stationary washstands, and sanitary tables and other apparatus essential to a ready, efficient, and sanitary conduct of the inspection. The floors shall be of sanitary construction and shall have proper sewer connections, and when the final inspection place is part of a larger floor it shall be separated by a curb and railing.

(h) In each establishment at which any condemned article is held until a day subsequent to its condemnation, a suitably located room or compartment in which the same shall be placed. This room or compartment shall be secure, rat proof, and

susceptible of being kept clean, including a sanitary disposal of the floor liquids. It shall be equipped for secure locking, and shall be held under a lock furnished by the department of health, the key of which shall not leave the custody of inspector in charge. The door or doors of such room or compartment shall be conspicuously marked with the phrase "D. H. Condemned," in letters not less than 2 inches high.

(i) Rooms, compartments, and receptacles in such number and in such locations as the needs of the inspection in the establishment may require in which carcasses and products may be held for further inspection. These shall be equipped for secure locking and shall be held under locks furnished by the department, the keys of which shall not leave the custody of bureau employees. Every such room, compartment, or receptacle shall be conspicuously marked with the phrase "D. H. Retained," in letters not less than 2 inches high.

(j) Adequate facilities, including denaturing materials, for the proper disposal of condemned articles in accordance with these regulations. Tanks, which under these regulations must be sealed, shall be properly equipped for sealing as may be specified by the director of the bureau of food inspection.

(k) Docks and receiving rooms, to be designated by the establishment, with the approval of the inspector in charge, for the receipt and inspection of all meat and products under municipal control.

(l) Suitable lockers shall be provided, in which brands bearing the inspection legend shall be kept when not in use. All such lockers shall be equipped for locking with locks to be supplied by the department of health, the keys of which shall not leave the custody of the inspector.

REG. 5. *Inspectors to furnish implements for conducting inspections.*—Inspectors shall furnish their own implements, such as knives, steels, and triers, for conducting inspection; shall cleanse their hands and implements as prescribed by regulation 21.

REG. 6. *Inspection to be made before permit is granted.*—Prior to the granting of a permit and the inauguration of the establishment, an inspection of the premises shall be made by a duly authorized representative of the department of health and the requirements for sanitation and the necessary facilities for inspection specified.

REG. 7. *Plans to be submitted.*—Duplicate copies of plans, properly drawn to scale, and of specifications, including plumbing and drainage, for remodeling plants of establishments and for new structures, shall be submitted to the director of the bureau of food inspection in advance of construction.

REG. 8. *Establishments to be maintained in a sanitary condition.*—Establishments at which market inspection is conducted, and premises on or in which any meat or product is prepared or handled, shall be maintained in a sanitary condition.

REG. 9. *Abundant light and ventilation to be provided.*—There shall be abundant light, both natural and artificial, and sufficient ventilation for all rooms and compartments to insure sanitary condition.

REG. 10. *Drainage and plumbing.*—There shall be an efficient drainage and plumbing system for the establishment and premises, and all drains and gutters shall be properly installed with approved traps and vents.

REG. 11. *Water supply.*—The water supply shall be ample, clean, and potable, with adequate facilities for its distribution in the plant. Every establishment shall make known, and whenever required shall afford opportunity for inspection of, the source of its water supply and the location and character of its reservoir and storage tanks.

REG. 12. *Construction of floors, walls, ceilings, etc.*—The floors, walls, ceilings, partitions, posts, doors, and other parts of all structures shall be of such materials, construction, and finish as will make them susceptible of being readily and thoroughly cleaned. The floors shall be kept water-tight. The rooms and compartments used for edible products shall be separate and distinct from those used for inedible products.

REG. 13. *Rooms to be free from odors.*—The rooms and compartments in which any meat or product is prepared or handled shall be free from odors from dressing and toilet rooms, catch basins, hide cellars, casing rooms, inedible tank and fertilizer rooms, and stables.

REG. 14. *Establishments to be kept free from flies, rats, mice, and other vermin.*—Every practicable precaution shall be taken to keep establishments free of flies, rats, mice, and other vermin. The use of rat poisons is prohibited in rooms or compartments where any unpacked meat or product is stored or handled; but their use is not forbidden in hide cellars, inedible compartments, outbuildings or similar places, or in storerooms containing canned or tierced products. So-called rat viruses shall not be used in any part of an establishment or the premises thereof.

REG. 15. *Dogs not permitted in establishments except for destroying rats.*—Dogs shall not be permitted into establishments except, upon permission of the inspector in charge, for the purpose of destroying rats. Dogs which are admitted shall be kept free from tapeworm infestation. Such examinations shall be made to determine freedom from infestation. Contamination by the excreta of these animals shall not be permitted, nor shall the dogs be allowed to eat the raw viscera of cattle, sheep, swine, or goats.

REG. 16. *Sanitary facilities and accommodations to be provided.*—Adequate sanitary facilities and accommodations shall be furnished by every establishment. Of these, the following are specifically required:

(a) Dressing rooms, toilet rooms, and urinals sufficient in number, ample in size, conveniently located, properly ventilated, and meeting all requirements as to sanitary construction and equipment. These shall be separate from the rooms and compartments in which meat and products are prepared, stored, or handled. Where both sexes are employed, separate facilities shall be provided.

(b) Modern lavatory accommodations, including running hot and cold water, soap, towels, etc. These shall be placed in or near toilet and urinal rooms, and also at such other places in the establishment as may be essential to assure cleanliness of all persons handling any meat or product.

(c) Properly located facilities for disinfecting and cleansing utensils and hands of all persons handling any meat or product.

(d) Cuspidors of such shape as not readily to be upset and of such material as to be readily disinfected. They shall be sufficient in number and accessibly placed in all rooms and places designated by the inspector in charge, and all persons who expectorate shall be required to use them.

REG. 17. *Construction of equipment and utensils.*—Equipment and utensils used for preparing, processing, and otherwise handling any meat or product shall be of such materials and construction as will make them susceptible of being readily and thoroughly cleaned and such as will insure strict cleanliness in the preparation and handling of all meat and products. Trucks and receptacles used for inedible products shall bear some conspicuous and distinctive mark and shall not be used for handling edible products.

REG. 18. *Rooms to be kept clean and sanitary.*—Rooms, compartments, places, equipment, and utensils used for preparing, storing, or otherwise handling any meat or product, and all other parts of the establishment, shall be kept clean and sanitary.

REG. 19. *Cleanly and sanitary methods in preparing meat.*—Operations and procedures involving the preparation, storing, or handling of any meat or product shall be strictly in accord with cleanly and sanitary methods.

REG. 20. *Rooms to be kept free from steam and vapors.*—Rooms and compartments in which inspections are made and those in which animals are slaughtered, or any meat or product is processed or prepared, shall be kept sufficiently free of steam and vapors to enable inspectors of the department of health to make inspections and to insure

cleanly operations. The walls and ceilings of rooms and compartments under refrigeration shall be kept reasonably free from moisture.

REG. 21. *Butchers and others to cleanse hands after handling diseased carcasses.*—Butchers and others who dress or handle diseased carcasses or parts shall, before handling or dressing other carcasses or parts, cleanse their hands of grease, immerse them in a prescribed disinfectant, and rinse them in clean water. Implements used in dressing diseased carcasses shall be thoroughly cleansed in boiling water or in a prescribed disinfectant, followed by rinsing in clean water. The employees of the establishment who handle any meat or product shall keep their hands clean, and in all cases after visiting the toilet rooms or urinals shall wash their hands before handling any meat or product or implements used in the preparation of the same.

REG. 22. *Clothing of employees.*—Aprons, frocks, and other outer clothing worn by persons who handle any meat or product shall be of material that is readily cleansed, and only clean garments shall be worn. Knife scabbards shall be kept clean.

REG. 23. *Habits of employees.*—Such practices as spitting on whetstones, placing skewers or knives in the mouth, inflating lungs or casings, or testing with air from the mouth such receptacles as tierces, kegs, casks, and the like, containing or intended as containers of any meat or product, are prohibited. Only mechanical means may be used for testing.

REG. 24. *Wagons and cars to be kept clean.*—The wagons and cars in which any meat or product is transported shall be kept in a clean and sanitary condition. Wagons used in transferring loose meat and products between establishments shall be closed or so covered that the contents shall be kept clean.

REG. 25. *Use of second-hand tubs, barrels, and boxes.*—Second-hand tubs, barrels, and boxes intended for use as containers of any meat or product shall be inspected when received at the establishment and before they are cleaned. Those showing evidence of misuse, rendering them unfit to serve as containers for food products, shall be rejected. The use of those showing no evidence of previous misuse may be allowed after they have been thoroughly and properly cleaned. Steaming, after thorough scrubbing and rinsing, is essential to cleaning tubs and barrels.

REG. 26. *Surrounding premises to be kept clean.*—The outer premises of every establishment, embracing docks and areas where cars and wagons are loaded, and the driveways, approaches, yards, pens, and alleys shall be properly drained and kept in clean and orderly condition. All catch basins on the premises shall be of such construction and location and be given such attention as will insure their being kept in acceptable condition as regards odors and cleanliness. The accumulation on the premises of establishments of any material in which flies may breed, such as hog hair, bones, paunch contents, or manure, is forbidden. No nuisance shall be allowed in any establishment or on its premises.

REG. 27. *Health of employees.*—No establishment shall employ, in any department where any meat or product is handled or prepared, any person affected with tuberculosis or other communicable disease.

REG. 28. *Use of insanitary equipment prohibited.*—When necessary, inspectors of the department of health shall attach a "D. H. Rejected" tag to any equipment or utensil which is insanitary or the use of which would be in violation of these regulations. No equipment or utensil so tagged shall again be used until made sanitary. Such tag so placed shall not be removed by anyone other than an inspector of the department of health.

REG. 29. *Tanking and denaturing condemned carcasses.*—Condemned meat and products at establishments having facilities for tanking shall, except as hereinafter provided, be disposed of by tanking, as follows: The lower opening of the tank shall first be securely sealed by a bureau employee; then the condemned meat and products and a sufficient quantity of coloring matter or other substance, to be designated by the

department, shall be placed in the tank in his presence, after which the upper opening shall also be securely sealed by such employee, who shall then see that a sufficient force of steam (not less than 40 pounds) is turned into the tank and maintained a sufficient time effectually to destroy the contents for food purposes.

REG. 30. *Seals of tanks to be broken only by inspectors.*—The seals of tanks shall be broken only by an inspector of the department of health, after the product has been rendered as provided in regulation 29 of these regulations. The drawing off of the contents of such tanks shall be supervised by an inspector of the health department. Samples shall be taken by inspectors as often as required to determine whether the fat or grease is effectively denatured.

REG. 31. *Rendered fats and greases to be destroyed.*—Rendered fats and greases condemned on reinspection shall be destroyed for food purposes by denaturing with coloring matter or other designated substance.

REG. 32. *Method of destroying meat condemned.*—Any meat or product condemned at an official establishment which has no facilities for tanking shall, under the supervision of an inspector of the health department, be denatured with crude carbolic acid, or other prescribed agent, or destroyed by incineration. When such meat or product is not incinerated, all containers thereof shall be opened, and all meat shall be freely slashed with a knife, before the denaturing agent is applied.

REG. 33. *Carcasses and parts passed for sterilization may be rendered into lard, etc.*—Carcasses and parts passed for sterilization may be rendered into lard or tallow provided that such rendering is done in the following manner: The lower opening of the tank shall first be securely sealed by an inspector of the department of health, then the carcasses or parts shall be placed in the tank in his presence, after which the upper opening shall be securely sealed by such inspector, who shall then see that a sufficient force of steam is turned into the tank. Such carcasses and parts shall be cooked at a temperature not lower than 220° F., for a time sufficient to render them effectually into lard or tallow.

REG. 34. *Rendering of lard.*—Establishments not equipped with steaming tanks for rendering carcasses and parts into lard or tallow, as provided in regulation 33 of these regulations, may render such carcasses or parts in open kettles under the direct supervision of an inspector of the department of health. Such rendering shall be done at a temperature and for a time sufficient to render the carcasses and parts effectually into lard or tallow, and shall be done only during regular hours of work.

REG. 35. *Disposition of carcasses passed for sterilization and rendered into lard.*—Carcasses and parts passed for sterilization and which are not rendered into lard or tallow may be utilized for food purposes provided they are first sterilized by methods and handled and marked in a manner approved by the director of the bureau of food inspection.

REG. 36. *Canning of carcasses or parts passed for sterilization.*—Any carcasses or parts prepared in compliance with regulation 33 of these regulations may be canned if the container be plainly and conspicuously marked so as to show that the product is second grade, class, or quality and has been sterilized.

Tents and Camps—Regulation of. (Reg. Dept. of Health, Mar. 30, 1915.)

Regulations of the department of health of the city of New York, adopted March 30, 1915, effective April 1, 1915, relating to section 217 of the Sanitary Code, which provides as follows:

SEC. 217. *Establishment and maintenance of tents and camps regulated.*—No tent shall be raised or erected or any camp established, in the city of New York, to be used or occupied by any persons as a place for living or sleeping, nor shall any such tent or camp be so used or occupied without a permit therefor issued by the board

of health or otherwise than in accordance with the terms of said permit and with the regulations of said board.

REGULATION 1. Evidence of ownership of ground, to be submitted.—The premises on which tent or camp is located shall be owned by the applicant or proof furnished by him that premises are occupied by permission or under lease from owner.

REG. 2. Drinking water.—An adequate supply of drinking water shall be provided on camp grounds; at least one tap shall be provided for every four tents; such taps to be so arranged as to be easily accessible to occupants of tents; water from wells other than the public water supply shall not be used without a permit from the department of health.

REG. 3. Discharge of waste liquids.—Waste liquids shall be discharged into a sewer where available, a cesspool, or in any case so as not to create a nuisance.

REG. 4. Water-closets.—Properly trapped, flushed, sewer-connected water-closets shall be provided where such sewer connections are possible; such water-closets shall be maintained in suitable, adequately ventilated compartments.

REG. 5. Privies.—Where sewer connections are not possible, suitable type metal cans or pails shall be provided for privies in suitable and adequate privy houses.

REG. 6. Construction of privy houses.—The privy houses shall be adequately ventilated to the external air, and all openings therein properly screened and protected against flies, and provided with a sufficient number of seats and cans or pails; the door of each privy house shall be self-closing; the privy house shall be so constructed as to permit of the removal of the cans and of the cleaning of the floor and space beneath the seats; the seats shall be provided with tight-fitting covers, kept closed when not in use; such privy cans or pails shall be set at least 4 inches above the surface of the surrounding ground on a platform of nonabsorbent material, so placed and set as to fit close to the seat so as to prevent saturation of the woodwork around the same by filthy liquids.

REG. 7. Care of privy cans and pails.—An adequate supply of sand or lime shall be provided in the privy house. It shall be the duty of all persons using such privy house to sprinkle a small quantity of such sand or lime in the cans or pails provided therein, after each use thereof.

REG. 8. Scavenger service to be provided.—When the cans or pails are three-quarters full, they shall be removed, emptied, cleaned, and disinfected by a licensed scavenger, and the contents disposed of according to the terms of the scavenger's permit.

REG. 9. Exception to scavenger service.—Where no scavenger service can be provided, the cans or pails before they are more than three-quarters full shall be removed from the privy, after having been properly and tightly covered, and carried at least 200 feet from the camp site and the contents there buried in a trench at least 3 feet deep, so that when buried there shall be at least 2 feet of earth cover, and the trench then properly filled in, provided that such night soil shall not be buried in any place where it or seepage from it may contaminate any water supply.

REG. 10. Garbage disposal.—All garbage and refuse shall be stored in metal cans with tight fitting metal covers, and such garbage and refuse shall be removed from the camp site daily.